

The Condition of Our State's Waters





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WV Save Our Streams would like to recognize all the volunteer monitors, not only those directly associated with the program, but any others who have given their time and energy in an effort to protect our state's streams and rivers. WV Save Our Streams would also like to recognize all of the agency and other partners who have provided assistance of any kind, to help guide volunteers through the myriad of processes involved with water quality issues.

"Perception is not acquired by formal education, nor is it reserved for persons learned in the arts or sciences. Perception is a recognition of the values found in natural things, and it is something that grows through our experiences at various stages of development."

Adapted from Round River: From the Journals of Aldo Leopold, preface by Luna Leopold.

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PROGRAM OVERVIEW

The West Virginia Save Our Streams Program's major goal is to improve and protect the water quality of the rivers and streams of our state. Two primary and equal objectives are used to accomplish this goal.

The first objective is to provide the state with enhanced ability to monitor and protect its surface waters through increased water quality data collection. Currently the state is only able to monitor a small percentage of its surface waters. Monitoring stations historically have been located around point source discharges, leaving vast stretches of rivers unmonitored because they traverse rural or urban areas for which there are few or no permitted discharges. Without adequate information on these rivers, the state is unable to discern current impacts from nonpoint source pollution or to determine areas that may improve due to installation of Best Management Practices (BMP's).

The second objective is to improve water quality through educational outreach to West Virginia's citizens. Once citizens are actively involved in stream monitoring and restoration activities, they can begin to initiate projects in their own watersheds to improve stream quality. For example, as a result of mapping land uses in their watershed and conducting regular water quality monitoring using the program biological monitoring technique, participants can spot trouble areas in need of restoration or pristine areas in need of continuing protection. Activities can be implemented to improve water quality, such as using BMP's on farms, installing wooded buffer zones in riparian areas, cleaning up trash and debris through stream cleanups and other projects. Participants are given how-to fact sheets for these activities as well as information on appropriate state documents and regulations.

The program provides a unique mechanism to instruct West Virginia citizens on the need to monitor and restore the state's waterways. It is West Virginia's Department of Environmental Protection (DEP), Division of Water and Waste Managements goal to implement through the program, with the help of a coordinator, a combined effort of local, state and federal government agencies, local organizations and volunteers to improve water quality and natural habitat by various projects that help protect our water resources.

The Workshops

The program coordinator oversees workshop sessions. Each workshop is designed to educate citizens on pollution problem recognition, state regulations and programs pertaining to pollution abatement, such as West Virginia's Nonpoint Source Pollution Management Plan. Workshop sessions include a slide show, discussion, video, practice scenarios or other learning tools and activities to demonstrate stream pollution problems, monitoring techniques and restoration practices. The major focus of the workshop is the streamside, hands-on demonstrations of the program's stream monitoring techniques.

Once a monitor has been trained in accordance with the program's guidelines and is certified, he/she will receive the equipment and can begin to conduct surveys. After each survey, the monitor sends the data collected to the program coordinator to review for accuracy. The

coordinator reviews the field survey sheets for any water quality problems and for corrections, if any are needed. Then, if any corrections are needed the sheets are returned to the monitor with the necessary comments. After the results have been analyzed, the program coordinator will summarizes the information and later stores it into a computer database. Any severe pollution problems may be investigated further after the appropriate regulatory agencies are notified.

Regional coordinators, local program monitors and others may be called upon to assist new monitors in specific technique difficulties and solving pollution problems. All of these individuals have been trained to use the programs method and are active participants in the program. In addition to the initial workshop volunteer monitors are required to maintain their certification through annual refresher trainings and testing. The WV Save Our Streams Program offers several types and levels of training:

- Level 1 (Beginning Level): Introduces the concepts of biological/physical stream monitoring and follows methods similar to the Izaak Walton League of America (IWLA) Save Our Streams protocols. Groups participating at this level receive a certificate, resource materials and basic biological monitoring equipment. These workshops are approximately 6-8 hours in length with both in-class and hands-on demonstrations along a stream or river reach.
- Level 2 (Intermediate Level): Expands upon the stream assessment protocols by introducing invertebrate counts, simple biotic indices and a more thorough habitat assessment. Participants receive resources similar to the above. The level two workshops last one to two days depending upon the requirements of the group. Prerequisites are a level one workshop or some familiarity and experience with biomonitoring methods.
- Level 3 (Advanced Level): Closely follows US EPA Rapid Bioassessment Protocols for stream assessment. The resources provided are similar to the above levels, but are often more advanced and somewhat specific based upon the goals of the volunteer group. The level three workshops last two to three days with a variety of demonstrations and exercises both inside and along a stream or river reach. Prerequisites are a level one or level two workshop and experience using WV Save Our Streams or other similar biomonitoring methods.
- Trainers Certification: This is a two-day workshop for those interested in becoming official training designees of WV Save Our Streams. The course is offered to those who have been monitoring using the WV Save Our Streams methods for at least one year and are comfortable teaching the methods to others. Previous monitoring experience can be substituted under certain circumstances; however, the trainer must be WV Save Our Streams Certified to the level at which they plan to teach. The program coordinator reserves the right to approve participants based upon level of experience and commitment to the WV Save Our Streams Program.
- Specialized Training: Additional specialized training workshops can also be scheduled. These types of trainings are designed to fit more specific needs of a group. Examples include assistance with study designs, sedimentation and channel measurements (i.e. pebble counts and cross sections), watershed surveys and monitoring nutrient impacts through physical characterizations.

Workshops are scheduled around the state in areas where either the state has requested additional monitoring or where there is a high level of public interest. These workshops are open to the public and are often advertised in West Virginia magazines, newspapers, and other state agency publications.

ASSESSMENT METHODS

The method of assessment depends largely upon the level of training provided and the volunteer's time and attention to detail. Most experienced groups use a more advanced assessment approach for data collection and a simpler level as an outreach tool in their watershed. However, all groups begin with level one and move to more advanced levels as their expertise and familiarity with the methods improve.

Biological Integrity

Biological integrity is commonly defined as "the ability to support and maintain a balanced, integrated, and adaptive community with a biological diversity, composition, and functional organization comparable to those of natural aquatic ecosystems in the region" (Karr and Dudley 1981, and Karr et al. 1999). The U.S. Environmental Protection Agency has endorsed the use of biological integrity as an indicator of environmental condition and, more specifically, ecological health. It is unique among currently used indicators in that it uses information gathered directly from the aquatic organisms and the biological community of which they are a part. Over time, aquatic organisms are often exposed to a variety of factors that cause stress to the community. If collected and analyzed properly, the condition of the community can help to characterize many types of cumulative environmental impacts.

The groups of animals found in leaf packs, rocks, woody debris and other areas of streams, rivers, ponds and wetlands are collectively called benthic macroinvertebrates (Table 1). Benthic refers to the bottom, in this case the bottom of a stream. Macroinvertebrates are animals without a backbone that can be seen with the naked eye. These bottom-dwelling animals include crustaceans and worms but most are larvae of aquatic insects. Macroinvertebrates are an important link in the food web between the producers (leaves, algae) and higher consumers such as fish. West Virginia Save Our Streams uses macroinvertebrates as the primary indicators of biological integrity. Algal growth conditions and other aquatic animals and plants are also used on a limited basis.

All insects go through a series of changes (metamorphoses) during their life cycle. Insect life cycles can be grouped as either complete or incomplete metamorphoses. Incomplete metamorphosis lacks the pupae stage and the nymph and adult are more similar in appearance. A complete metamorphosis includes a pupae stage, and often the adult and larva tend to look very different from each other. The insect groups of the macroinvertebrate communities show both kinds of metamorphosis. Most aquatic insects remain underwater in the immature stages and leave the stream only as adults. The life cycles of the insect groups of macroinvertebrates can range from a few months to several years.

Table 1. Orders and Classes of Commonly Collected Macroinvertebrates

Aquatic Insects			
Ephemeroptera Plecoptera Trichoptera	Crayfish, Scuds and Sowbugs	Worms, Leeches and Flatworms	Snails, Clams and Mussels
Odonata Coleoptera Megaloptera Diptera	Decapoda Isopoda Amphipoda	Oligochaeta Hirudinea Turbellaria	Gastropoda Bivalvia

Macroinvertebrates are often divided into categories based upon their tolerance to stress. This stress is caused by various kinds of human induced and natural disturbances that may occur in stream and river environments. These categories are often described in both qualitative and quantitative terms. The narratives and the scale below more precisely describe the stress tolerance rating categories commonly used for most kinds of macroinvertebrates.

- Very Sensitive: Invertebrates that occur mostly in pristine environments with little or no disturbances. They usually do not occur in high numbers, nor does one kind dominate the entire population.
- **Sensitive**: Invertebrates that occur in a range of environments from little or no disturbance to moderately disturbed conditions. They may occur in slightly elevated numbers under certain conditions.
- **Somewhat Tolerant**: Invertebrates that occur in a range of environments from moderately to highly disturbed conditions but can also occur in less disturbed conditions. Their high numbers are often good indications of disturbance.
- **Tolerant**: Invertebrates that occur most often disturbed conditions. In very disturbed environments only one or two kinds may dominate the entire population. They are also found in good conditions, but usually in very low numbers.
- **Very Tolerant**: Invertebrates that occur most often in highly to very disturbed conditions and their numbers may be extremely high or they may dominate the community. They are also occasionally found in less disturbed conditions.

Very	Very Sensitive Sensitiv			Som	ewhat Tol	erant	Tolera	nt	Very Tolerant			
0	1	2	3	4	5	6	7	8	9	10		

The Analyses of Biological Integrity

The program uses a standardized approach to collection (500-micron kick seine) focusing on the riffle and run habitats. The program's methods are generally field based, with a variety of unique modifications to make sorting, counting and identification somewhat easier. A minimum of two and a maximum of four kicks are performed throughout the 100-meter reach in a variety of riffle or run habitats. The volunteers will count, sort and identify 200 or more invertebrates from these combined samples. If a minimum of 200 is collected after two kicks, than no more collection is necessary, if however the 200-target is not reached after two kicks, collection is continued until 200 are collected or until four kicks have been performed.

The metrics (mathematical formulas) used to analyze the samples were chosen based upon invertebrate samples collected by Downstream Alliance (DA), Jefferson County Watershed Coalition (JCWC), Guardians of the West Fork (GWF), WV Department of Highways (DOH), DEP's Watershed Assessment Section (WAS) and WV Save Our Streams. Approximately 300 stations with family-level identification and/or counts to the order level from DA, JCWC, GWF, and DOH and an additional 300 random collections from WAS and WV Save Our Streams from basins throughout the state were used to develop the metrics.

The metrics that make up the IBI (Index of Biological Integrity) were chosen based largely upon the standard metrics that make up the WV Stream Condition Index (WVSCI) with slight modifications for the field and ease of use by volunteers (Table 2). The final score, called the Stream Condition Index, is an average based upon all metrics or a select few depending upon the conditions of the assessment. This final score is given a rating of optimal, sub optimal, marginal or poor based upon the scale below.

Optimal	Sub Optimal	Marginal	Poor
> 80	80 - 65	64.9 - 50	< 50

Table 2. The WV Save Our Streams Index of Biological Integrity

Metrics That Decrease With Stress		
	Value X	Reference Formula
Total Taxa	21	$= 100 \times (X \div 21)$
EPT Taxa	13	$= 100 \times (X \div 13)$
% EPT Abundance	90	$= 100 \times (X \div 90)$
Metrics That Increase With Stress		
	Value X	Reference Formula
% Chironomidae	2	$= 100 \times [(100 - X) \div 98]$
% Dominant Taxa	30	$= 100 \times [(100 - X) \div 70]$
Modified Hilsenhoff Biotic Index (HBI)	3.0	$= 100 \times [(10 - X) \div 7.0]$

The above metrics are part of the advanced program method. At the beginning and intermediate levels, volunteers use simpler formulas and are taught the use of the more advanced mathematical derivations as they advance through the levels. WV Save Our Streams also provides a spreadsheet that will automatically calculate the metric scores. The above metrics are described in more detail in the appendix section of this report.

Habitat Assessment

The volunteer monitors complete a visual assessment at each monitoring station. A 100-meter section of stream and the land in its immediate vicinity are qualitatively evaluated for in-stream and streamside habitat conditions. The volunteer's also record physical measurements, potential for erosion, surrounding land uses that may be impacting the site, focusing mostly on non point sources of pollution and other anthropogenic disturbances. They also record information about substrate composition, water conditions and the riparian buffer.

An important part of the assessment is the scoring of habitat conditions most likely to affect the aquatic life in the stream. At the advanced level, ten parameters are evaluated using a scale of 0-20. Habitat conditions are also evaluated at the beginning and intermediate levels.

- Optimal (excellent) conditions describe habitat quality that meets natural expectations
- **Sub-optimal** (good) conditions describe habitat quality that is slightly less than expected but still adequate
- Marginal conditions describe habitat quality with moderate to high levels of degradation
- Poor conditions describe a habitat that is substantially altered

Optimal Sub Optimal						Marginal					Poor									
20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0

The habitat conditions used by the program are as follows:

- 1. **Attachment sites for macroinvertebrates** refer to the amount of living space or hard substrates (i.e. rocks, woody debris, vegetation etc.) available for macroinvertebrates.
- 2. **Stream velocity and depth combinations** are important to the maintenance of healthy aquatic communities. Fast water increases the amount of dissolved oxygen in the water; keeps pools from being filled with sediment; and helps food items like leaves, twigs, and algae move more quickly through the aquatic system. Slow water provides spawning areas for fish and shelters macroinvertebrates that might be washed downstream in higher stream velocities. Similarly, shallow water tends to be more easily aerated (i.e., it holds more oxygen), but deeper water stays cooler longer. Thus the best stream habitat includes all of the velocity/depth combinations and can maintain a wide variety of organisms.
- 3. **Channel flow status** is the percent of the existing channel that is filled with water. The flow status changes as the channel enlarges or as flow decreases as a result of dams and other obstructions, diversions for irrigation, or drought. When water does not cover much of the streambed, the living area for aquatic organisms is limited.
- 4. **Sediment deposition** is a measure of the amount of sediment that has been deposited in the stream channel and the changes to the stream bottom that have occurred as a result of the deposition. High levels of sediment deposition create an unstable and continually changing environment that is unsuitable for many aquatic organisms.
- 5. **Embeddedness** refers to the extent to which rocks (gravel, cobble, and boulders) are surrounded by, covered by, or sunken into the silt and sand of the stream bottom. As rocks become embedded, fewer living spaces are available to macroinvertebrates and fish for shelter, spawning and egg incubation. To estimate the percent of embeddedness, observe the amount of silt or finer sediments overlying and surrounding the rocks. If kicking does not dislodge the rocks or cobbles, they are probably greatly embedded.
- 6. **Frequency of Riffles** refers to the measure of the riffle sequence found within the stream reach. Riffles are a high quality habitat. Therefore, an increased frequency of occurrence enhances the diversity of the stream community.
- 7. **Channel alteration** is basically a measure of large-scale changes in the shape of the stream channel. Many streams in urban and agricultural areas have been straightened, deepened (e.g., dredged), or diverted into concrete channels, often for flood control purposes. Such streams have far fewer natural habitats for fish, macroinvertebrates, and plants than do naturally meandering streams.

The next three parameters are scored from both sides of the bank:

- 8. **Condition of banks** measures erosion potential and whether the stream banks are eroded. Steep banks are more likely to collapse and suffer from erosion than are gently sloping banks and are therefore considered to have high erosion potential. Signs of erosion include crumbling, unvegetated banks, exposed tree roots, and exposed soil.
- 9. **Riparian vegetative zone width** is defined here as the width of natural vegetation from the edge of the stream bank. The riparian vegetative zone is a buffer zone to pollutants entering a stream from runoff. It also controls erosion and provides stream habitat and nutrient input into the stream. A wide, relatively undisturbed riparian vegetative zone reflects a healthy stream system.
- 10. **Bank vegetative protection** measures the amount of the stream bank that is covered by natural (i.e., growing wild and not obviously planted) vegetation. The root systems of plants growing on stream banks help hold soil in place, reducing erosion. Vegetation on banks provides shade for fish and macroinvertebrates and serves as a food source by dropping leaves and other organic matter into the stream.

An overall integrity score and rating is determined by simply dividing the score received by the total points possible. This result is multiplied by 100 and compared to an integrity rating scale.

Physiochemical Monitoring

Volunteer monitors often collect select physiochemical data, especially temperature, pH, dissolved oxygen, and on occasions, conductivity. These types of measurements are helpful for providing clues about sources of stressors. Other more advanced groups may collect a suite of chemical information related to the specific impairments in their watershed. For example, several groups in the northern part of the state monitoring parameters related to polluted coalmine drainage and a few groups also incorporate fecal coliform analysis. WV Save Our Streams provides training for water quality collection and analysis, and assistance with study design, but does not provide any type of equipment to carry out the procedures, except for temperature and pH. Those groups that collect this information do so at their own expense or through grants that subsidize the cost of this analysis.

Water quality analysis is an important part of the determination of the overall quality of our streams and rivers, and in most cases this component of volunteer monitoring programs has been dramatically under funded. It is my hope that in the near future additional funding may become available so that a sustainable chemical water quality analysis component can be added to the program.

PROGRAM ASSESSMENT METHODS

Quality assurance is maintained through regular training, random field checks, consistent data assessment and summary techniques and constant updates and communication. The coordinator maintains the bulk of the survey information, but the volunteer groups are encouraged to keep their own files so that they can easily communicate necessary information to the local communities.

The program coordinator assesses each survey that is submitted, summarizes the information using a standard summary sheet (Figure 1) and sends a response, when necessary to the volunteers. The summary information is filed electronically, made available as requested and shared with other sections within WV DEP, as well as other state and federal agencies and variety of partners. This information is not yet posted on the web, nor is it in a Graphic Information Systems (GIS) format.

Simple statistical analyses are used to compare the information whenever possible, and various graphical formats are used to show trends over time. Both the biological and habitat integrity scales are in a consistent format so that they can easily be compared and understood.

SUMMARY DATA SHEET Water Level Low Normal High Dry Discharge (cfs) Survey Code ather conditions Monitor(s) County LAND USE IMPACTS: Volunteers estimate the level of impact using the approximate location (S) streamside, (M) within Station Watershed Land Use WATER QUALITY Intensive feedlots
Pastureland
Cropland Sub-urban developments Urban areas Oil & gas wells PHYSICAL CONDITIONS Parking lots, malls etc Logging Mountaintop mining Bridges Paved roads Abandoned mining Algae color Water color Unpaved roads Active construction Deep mining Quarries Parks, trails etc Trash dumps Comments Overall Impact Slight Moderate High MACROINVERTEBRATES COLLECTED: The total number of groups, the number of kinds or families, or the relative abundance is recorded below. The method of recording the information depends upon the level of assessment. STREAMBED COMPOSITION: Results are either an estimate of riffle composition or percentages from pebble count Silt/clay Sand Fine gravel Coarse gravel INTEGRITY HABITAT ASSESSMENT Sediment deposition HABITAT INDEX Comments STATION INDEX INTEGRITY BIOLOGICAL ASSESSMENT OVERALL ASSESSMENT % EPT Abundance **FPT Taxa** % Dominant Taxa Partially Supporting SOS Indi Discuss the present and future treats or provide any additional comments STREAM INDEX INTEGRITY Other organisms observed or collected

WV Save Our Streams

Figure 1. Program Summary Sheet

WV Save Our Streams

VOLUNTEER DATA SUMMARIES



Students from Pendleton County Middle School collect and analyze water samples from the North Fork.

The remainder of this report contains information about activities and summary data collected by the volunteers. The bulk of the data is provided in the appendices. However, overall assessment tables are included in the body of this report as well as additional tables and graphical representations depicting certain aspects of the information. Additional information on projects and other reported information involving volunteers is also included. The reporting period for this report includes data collected and submitted from January 2003 through January 2004. In addition, 2002 information may be included if it was not included in previous reports.

The data collected by volunteers is grouped into the U.S. Geological Survey (USGS) scheme of hydrologic units, which divides the state into 32 major drainage basins. Some of these are entire stream basins with a natural hydrologic boundary, while others are divided

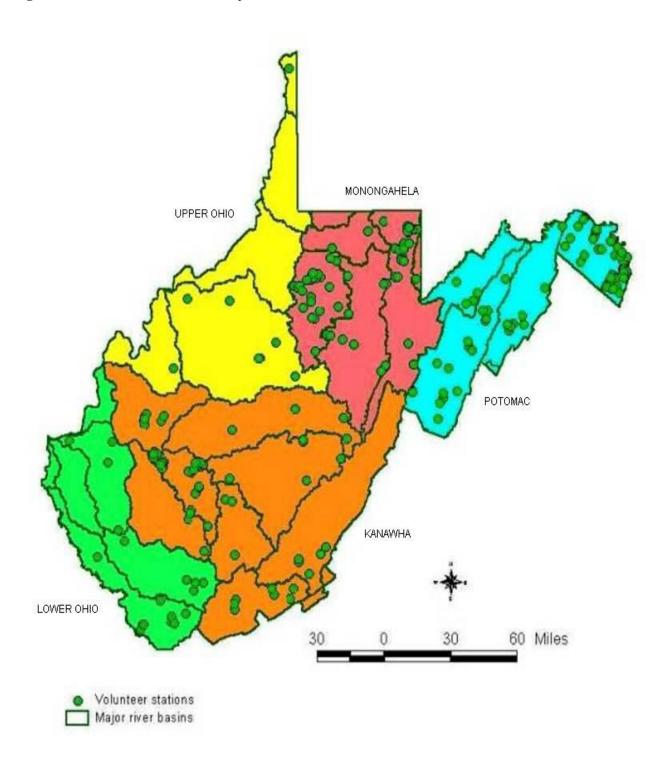
for manageability. For the purposes of this report these basins are organized into larger basins, shown on the map (Figure 2) on the next page. The basin groupings and names are based mostly upon their natural hydrologic connections or their proximity to one another.

The information presented in this report is summarized at the beginning of each section and an overall assessment table is provided at the end of the section. All other tables appear in the appendix sections. The integrity rating of optimal, sub-optimal, marginal and poor, and a category rating of fully supporting, partially supporting and non-supporting are provided.

- Fully supporting: All attributes are adequate to support healthy stream conditions
- Partially supporting: One or more attributes show signs of disturbance, and overall do not fully support healthy stream conditions
- Non-supporting: All attributes show signs of disturbance and do not support healthy stream conditions

In some cases the category rating of **threatened** may be used to describe the stream reach. Threatened refers to a condition(s) that may be impaired but does not effect the overall quality of the stream. For example, the overall habitat conditions may be assessed as sub-optimal, but a single attribute, such as sediment deposition may be assessed as marginal. The biological integrity, overall habitat integrity and water quality are used to determine the category ratings.

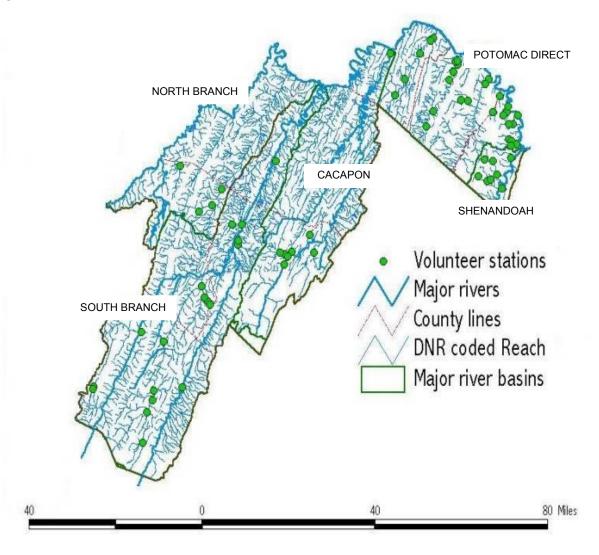
Figure 2. Basin Divisions for This Report



THE POTOMAC BASIN

This region of West Virginia has shown the most consistent and sustained volunteer monitoring over the past several years. In 2002–2004 volunteers monitored 75 stations at least once (Figure 3), and about 50% of these stations were monitored on multiple occasions. Most of the long term monitoring has taken place in the Potomac Direct Drains and Shenandoah basins. The habitat and biological integrity rated in the low sub-optimal range and overall 45% of the stations were fully supporting, 27% were partially supporting and 28% were non-supporting. Impacts associated with development and agriculture seem to be the most significant contributors to stream disturbances in this region. Table 3 at the end of this section provides a look at the overall assessment within the basin.

Figure 3. Volunteer Stations in the Potomac



Volunteer monitoring groups from this region that sent information during this reporting period include Blue Heron Environmental Network, Sleepy Creek Watershed Association, Department of Highways, Marshall University, Cacapon Institute, Bakers Run Conservation Society, Friends of Spring Run, Jefferson County Watershed Coalition, The Mountain Institute, Berkeley County Chapter of the IWLA and Pendleton County Middle School.

Potomac Direct Drain

Back Creek Watershed

The guardian of this basin is the Blue Heron Environmental Network (BHEN). This group is one of the most active groups in the state and has been successful with many of their outreach campaigns in support of clean and healthy streams. The Back Creek Water Quality Initiative is one example of their efforts.

This effort involves working with landowners to help them understand and protect the resource by encouraging water monitoring and protection of buffers throughout the Back Creek Valley. Another part of the initiative is the effort to become part of the Wild and Scenic Rivers Program. BHEN began the process several years ago as a way to further the protection and preservation of their stream. Progress has slowed somewhat due to the local political climate, but a majority of the local residents support the effort.

The focus of the group the past few years has been to learn more about the effects of sediment; with the help of WV Save Our Streams, they have begun research into methods that can be used

BHEN host the first stream workshop dedicated specifically to sediment monitoring. Several watershed groups in the Potomac Basin participated in the training.



by volunteers to establish baseline conditions. A few workshops have occurred and thus far the focus has been on monitoring surface sediment and channel stability through a variety of pebble count methods and cross section measurements. In addition, BHEN helps to educate landowners and developers, and to encourage the use of the appropriate BMP's. Usually, the right procedure involves a combination of techniques such as silt fences, buffers, quick revegetation and the careful planning for drainage and water storage.

The group has focused their monitoring efforts on the tributaries of Kate's Run, sections of Tilhance Creek and a small headwater stream named Harper Run. Many consider Harper Run to be an intermittent stream, however the group is well aware of its existence and its unique wetland environment. Harper Run has also been an area of contention for the group due to activities associated with the

Tomahawk Race Track. There has been no good faith effort on the part of the track owners and operators to protect the resource, and the results have had dramatic impacts on this small

headwater stream. Landowners in the area have requested assistance from Blue Heron on several occasions, and thus far at least two surveys have been completed. The pictures on the next page dramatically illustrate the impacts to this small stream. Ask yourself the question; if you were an aquatic organism would you be able survive here?

Kate's Run is a small stream that drains from the northwestern corner of the watershed below the Berkeley County Landfill. The Run flows through some relatively old bottomland hardwood forest and has supported a wide variety of aquatic organisms. However, the landfill has had a dramatic impact on this stream in the past and there are still problems today. Since the early 1990's the stream has scored in the optimal range for biological integrity, but surveys indicate a decline in abundance and diversity.

Problems associated with the landfill's lining may be a possible cause of the decline as well as new housing developments in parts of the drainage. An unexplained white/gray fungus has been observed during low flow conditions on several occasions.







The 1st photo is Harper Run above the track; the second photo, silt fences placed directly into the stream creating a sediment dam; in the 3rd photo it is difficult to distinguish between land and water, in this case dirt was piled into the stream during trail construction.

Sleepy Creek Watershed

The Sleepy Creek Watershed is a sister and neighbor basin to Back Creek with many similarities. The guardian of this basin is the Sleepy Creek Watershed Association (SCWA). SCWA are active monitors of their stream, and they are closely monitoring the development that is rapidly approaching. The group has been able to maintain good relationships with landowners that live along the stream, mostly through their monitoring and non-confrontational outreach efforts. They have formed partnerships with Shepherd University and Canaan Valley Institute, and using a summer intern have compiled information, which they hope to use to show the value of their water resources.

The stream thus far has fairly good overall integrity with 57% of the stations fully supporting and 43% partially supporting mostly due to habitat conditions. Recent surveys focusing on the habitat have indicated deterioration, especially in the condition of the banks and the width of the

riparian buffers (Figure 5). Several property owners have encroached upon the buffer zone through their landscaping and gardening activities.

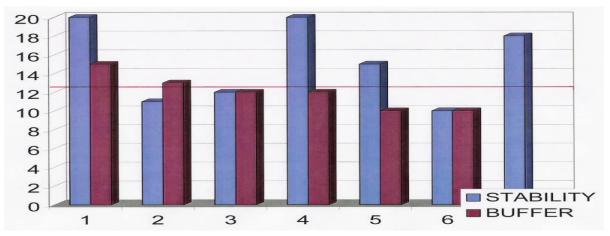


Figure 5. Buffer and bank stability conditions along Sleepy Creek

Stream Stations

Subdivision development and construction activities are on the rise in much of the watershed with development occurring on or near the ridge-tops and adjacent to tributaries of Sleepy Creek. This is a concern to some of the SCWA members, and they are beginning to closely monitor the headwater and smaller tributaries that feed into the Sleepy Creek. No specific procedures are in place by the state to target these smaller very important water resources, so the group is looking into alternate methods, such as protocols used by the Ohio EPA for monitoring headwater streams.

Cacapon

Several groups are active in the Cacapon; these include the Friends of the Cacapon River, Bakers Run Conservation Society, and the Cacapon Institute. However, monitoring reports in 2003 and 2004 were sparse. This report contains information in the watershed from Bakers Run, contractors for the WV Department of Highways (DOH) and Marshall University (MU). The surveys reviewed from DOH and MU is part of the characterization of the streams that may be impacted during on-going construction of Corridor H through the area (Figure 5).

Stream Scholars study macroinvertebrates collected from Skaggs Run.

Even though actual surveys were somewhat limited, outreach activities were ongoing. The Cacapon

Institute (CI) is one of the most active organizations. One example of CI's programs is **Stream Scholars**, a hands-on exploration of stream ecology for 7th through 9th grades that takes place in the summer months. CI also recently unveiled its virtual stream classroom for elementary

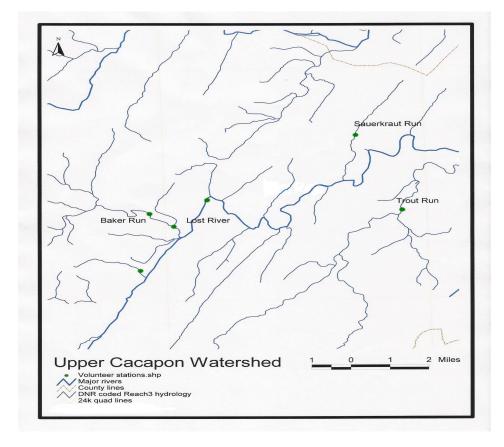
through high school students. More information about the CI's outreach activities, research projects and publications is on their web page at: http://www.cacaponinstitute.org/.

The Bakers Run Conservation Society hosts a **Watershed Awareness Day** at Hardy Middle School in the fall, which highlights many different types of water related activities including biomonitoring, habitat assessment, and fly fishing just to name a few. Carla Hardy of the WV Conservation Agency (WVCA) is an active partner and does a great deal of work to help organize this and other local events that highlight water quality and awareness.

The stations monitored within the Cacapon showed very healthy conditions overall, with 83% of the sites fully supporting. Most of the stations had optimal or sub-optimal biological and habitat integrity, and good water quality. Long Lick Run and sections of Sauerkraut Run scored slightly less than expected with only marginal habitat conditions.

An observed increase in algae growth was noted along some sections of Bakers Run and within certain reaches of the Cacapon and Lost Rivers. There is a great deal of agricultural activities along many of these waters, but no specific cause has been indicated. Members of the Friends of the Cacapon, WV River Network, Cacapon Institute and others are working with the Nutrient Criteria Committee to research the impacts to our waterways from nutrients such as nitrates and phosphates. West Virginia does not yet have a specific criterion to indicate nutrient enriched conditions.

Figure 5. Volunteer Monitoring Stations in the Upper Cacapon



Although not indicated on the map, Corridor H travels throughout most of the Baker Run watershed.

The road also travels along many sections of the Lost River, and crosses Trout Run and Sauerkraut Run at several locations.

North and South Branch of the Potomac

Multiple stream surveys from DOH and MU were reviewed from this basin related to Corridor H construction activity. There are several active volunteer groups in the area in the upper reaches of the South Branch in Pendleton and Hardy Counties, and in the lower reaches of Hampshire County. Groups submitting information for this report include Pendleton County Middle School, Friends of Spring Run Wild Trout, The Mountain Institute and scattered surveys from area high schools. Conditions were variable with only 44% of the stations rating as fully supporting, the majority of these located in the South Branch Basin. North Branch information is limited, however no stations rated as fully supporting. Much of the disturbances to the stream environments are related to past mining activity in the North Branch and agricultural activity in the South Branch.

Several very interesting projects have come about in this region over the last several years. WV Save Our Streams has formed some unique partnerships with state agencies, watershed groups and education and outreach specialists. One example is the program's cooperation with The Mountain Institute (TMI). TMI is an outdoor learning retreat located near the summit of Spruce Knob, West Virginia's highest peak. WV Save Our Streams is a volunteer member of the staff and works with TMI staff to train teachers and students about stream ecology. The partnership has resulted in the Potomac Stream Samplers Project, which targets middle and high school students and teachers of the region.

Initially, teachers meet for a three-day summer workshop to learn stream and watershed assessment skills. Following in-school sessions, students and teachers travel to the Potomac headwaters on Spruce Knob for a two-day outdoor watershed study. TMI staff then assists students back in their own school environment, as they work in teams to carry out an

investigation of their local watershed including threats analysis (based on local land uses) and water quality sampling.

Data will be shared with other schools via an on-line interactive "stream status" map interface that will give students a context for their local measurements. Liaison with local watershed groups will provide discussion opportunities, reinforcement of concepts, and community connections. A final watershed remediation activity will be suggested and carried out by each class. The three-day development workshop that inaugurates these projects includes:

- Overview of upstream-downstream linkages
- Watershed assessment and land use mapping techniques
- Water quality sampling and river stage
- Data analysis techniques
- Curriculum integration brainstorming session

Potomac basin teachers learn an easy invertebrate field-sorting method during a summer workshop on Big Run located south of Spruce Knob.



In 2003, West Virginia Save Our Streams was the first to complete an ecological assessment of Spring Run. These assessments were completed due to concerns raised by Friends of Spring Run (FSR), a small watershed association that cooperates with the owners to operate a catch-and-release fly-fishing for a 1-3/4 mile length of the stream. The property owners offer visitors, residents and others the chance to experience fly-fishing for wild trout through a no fee permit process. This permit, issued by FSR, provides access to the stream and specific guidelines to insure its protection. FSR also provides education and outreach to a local high school and other groups through fly-fishing and other stream related activities, has dramatically improved the stream by installing a variety of habitat improvement and streambank stabilization structures, and has enhanced the riparian zone with plantings of native grasses and trees.

FSR has noticed a declining mayfly hatch, and a decline in the size and numbers of trout, and a change in distribution of trout in the stream. Spring Run has produced wild rainbow trout for more than 50 years due to its cold alkaline waters, continually fed by a large spring in the headwaters. FSR feels that the practices of the upstream hatchery and possibly other land uses are having a negative impact on the rainbow trout fishery, the water quality and the diversity of the benthic macroinvertebrate communities.

These initial assessments provided baseline data and a better understanding of this rather unique stream's ecology. This initial effort has resulted in plans for additional studies on the Run starting in 2005 and continuing for the next several years. These studies will monitor the effects of a new treatment system that the hatchery plans to implement within the next year. The study will monitor invertebrate communities, habitat conditions focusing on sediment, and chemical constituents related to nutrients.

Partners involved thus far include Cacapon Institute, WV Division of Natural Resources, WV Conservation Agency, WV Save Our Streams, WV DEP's Watershed Assessment Branch, WV Department of Agriculture and Friends of Spring Run. The project will be funded in part by a grant from the Stream Partners Program, Chesapeake Bay Program funding and a variety of inkind services provided by the partners.

Shenandoah

Jefferson County Streams

For the past eight years the Jefferson County Watershed Coalition (JCWC) with training support from Blue Heron Environmental Network has been monitoring the streams of Jefferson County which drain to the Potomac and Shenandoah Rivers. The coalition uses teams of students from Shepherd University and long-time volunteers to monitor 20 stations (Figure 6). JCWC uses a unique sorting device to capture and count all macroinvertebrates that they collect, and sometimes the numbers range in the thousands!

This process along with access to university labs adds a level of quality to the information not often duplicated by other volunteer monitors. Recently, WV Save Our Streams submitted portions of their biological data from Elk Run and Elk Branch to Tetra Tech, Inc. Tetra Tech is DEP's and EPA's contractor assisting with Total Maximum Daily Load (TMDL) development

throughout West Virginia. Tetra Tech plans to examine the information and use it to possibly enhance their model, thus better describing the ecological conditions of the region. Many streams in this area have been dramatically impacted by rampant development, inadequate sewage treatment and changes to the channel dynamics.

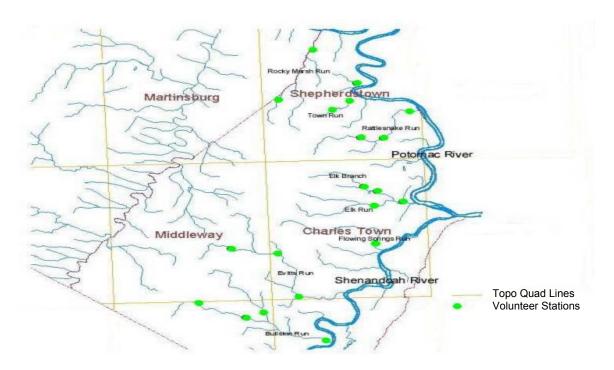
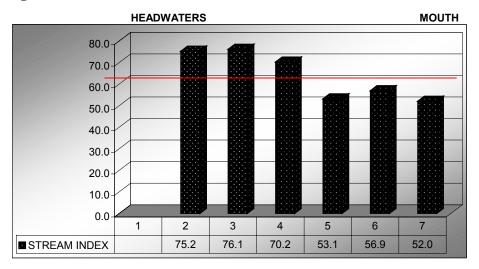


Figure 6. Jefferson County Watershed Coalition monitoring stations

Figure 7 provides an example of biological conditions from headwaters to mouth along Evitt's Run. The stream index score steadily declines as the stream flows towards the Shenandoah River. Many of the streams in the county seem to show a similar pattern, but even though the trends are clear, the county planners and developers show no signs of slowing progress. JCWC plans to enhance their monitoring effort by adding fecal coliform analysis (in order to gain more attention) and specific water chemistry, cutting back slightly on the analysis of the benthic macroinvertebrate communities.

Figure 7. Evitt's Run stream index scores



Scores below the red line indicate marginal biological integrity.

 Table 3. Potomac Overall Assessment

STREAM	BASIN	STATION	DATE	LADITAT	BIOLOGICAL		OVERALL		STATION
STREAM	DASIN	STATION	DATE	ПАВПАТ	BIOLOGICAL	FULLY	PARTIALLY	NON	STATION
BAKERS RUN	CACAPON	1		67.0	87.5	Х			77.3
BAKERS RUN	CACAPON	2		60.0	78.5	Х			69.3
BAKERS RUN	CACAPON	3		65.0	84.1	Х			74.6
BAKERS RUN	CACAPON	4	May-04	78.3	77.4	Х			77.9
LONG LICK RUN	CACAPON			58.0	83.7		Χ		70.9
LOST RIVER	CACAPON	1		82.0	83.9	Χ			83.0
LOST RIVER	CACAPON	2		82.0	86.3	Х			84.2
SAUERKRAUT RUN	CACAPON	1		66.0	50.8		Χ		58.4
SAUERKRAUT RUN	CACAPON	2		68.0	87.0	Х			77.5
TROUT RUN	CACAPON	1		65.0	75.9	Х			70.5
TROUT RUN	CACAPON	2		65.0	76.5	Х			70.8
WAITES RUN	CACAPON			80.0	87.0	Х			83.5
ABRAMS CREEK	NORTH BRANCH			41.0	28.1			Х	34.6
ELKLICK RUN	NORTH BRANCH			52.0	72.9		Х		62.5
NF PATTERSON CREEK	NORTH BRANCH	1		75.0	55.3		Х		65.2
NF PATTERSON CREEK	NORTH BRANCH	2		55.0	76.4		Χ		65.7
PATTERSON CREEK	NORTH BRANCH			79.0	67.0		Χ		73.0
BACK CREEK	POTOMAC DIRECT	3	Jul-04	63.3	73.8		Χ		68.6
ELK BRANCH	POTOMAC DIRECT		Oct-03		69.4	Χ			69.4
ELK RUN	POTOMAC DIRECT	1	May-03		63.4			Х	63.4
ELK RUN	POTOMAC DIRECT	2	Oct-03		67.3	Х			67.3
ELK RUN	POTOMAC DIRECT	1	Oct-03		70.8	Х			70.8
HARPER RUN	POTOMAC DIRECT		Jul-03	71.5	7.7		Χ		39.6
HALF MILE RUN	POTOMAC DIRECT		Mar-04	81.7	84.7	Х			83.2
KATES RUN	POTOMAC DIRECT		Jun-04	82.5	72.1	Х			77.3
OPEQUON CREEK	POTOMAC DIRECT	2	Jul-04	32.5	52.9			Х	42.7
OPEQUON CREEK	POTOMAC DIRECT	1	Oct-03	35.0	41.4			Х	38.2
RATTLESNAKE RUN	POTOMAC DIRECT	3	Sep-03		43.9			Х	43.9
RATTLESNAKE RUN	POTOMAC DIRECT	2	Sep-03	66.0	32.5		Х		49.3

STREAM	BASIN	STATION	DATE	HABITAT	BIOLOGICAL		OVERALL		STATION
OTTLAW	BAOII	OTATION	DATE	HABITAT	BIOLOGIOAL	FULLY	PARTIALLY	NON	OTATION
RATTLESNAKE RUN	POTOMAC DIRECT	1	Apr-03	66.0	75.4	Χ			70.7
RATTLESNAKE RUN	POTOMAC DIRECT	3	Apr-03	58.3	42.7			Х	50.5
RATTLESNAKE RUN	POTOMAC DIRECT	1	Apr-03		33.8			Х	33.8
ROCKY MARSH RUN	POTOMAC DIRECT	1	Oct-03		48.8		Χ		48.8
ROCKY MARSH RUN	POTOMAC DIRECT	2	Apr-03		50.1			Х	50.1
SLEEPY CREEK	POTOMAC DIRECT	1	May-04	83.3	73.1	Χ			78.2
SLEEPY CREEK	POTOMAC DIRECT	2	Jun-04	53.3	76.4		Х		64.9
SLEEPY CREEK	POTOMAC DIRECT	3	Jul-04	58.3	72.7		Х		65.5
SLEEPY CREEK	POTOMAC DIRECT	3	Nov-03	78.3	76.5	Χ			77.4
SLEEPY CREEK	POTOMAC DIRECT	2	Aug-03	66.7	77.3	Х			72.0
SLEEPY CREEK	POTOMAC DIRECT	1	Jul-03	58.3	60.0			Х	59.2
SLEEPY CREEK	POTOMAC DIRECT		Sep-04	96.7	72.4	Х			84.6
TOWN RUN	POTOMAC DIRECT		Oct-03		36.1			Х	36.1
TUSCARORA CREEK	POTOMAC DIRECT	1	Jul-04	75.0	60.0		Х		67.5
TUSCARORA CREEK	POTOMAC DIRECT	2	May-03	40.0	64.9			Х	52.5
ANDERSON RUN	SOUTH BRANCH		inc.y cc	54.0	55.1		Х		54.6
BIG RUN	SOUTH BRANCH	1	Apr-04	71.7	69.7	Х			70.7
BIG RUN	SOUTH BRANCH	2	Aug-04	64.5	94.3		Х		79.4
CLIFFORD HOLLOW	SOUTH BRANCH	_		76.0	85.3	Х			80.7
DUMPLING RUN	SOUTH BRANCH			57.0	69.7		Х		63.4
FORT RUN	SOUTH BRANCH			68.0	71.4	Х			69.7
NORTH FORK	SOUTH BRANCH		Oct-04	88.3	83.2	Х			85.8
SOUTH BRANCH	SOUTH BRANCH		Oct-04	53.3	61.6			Х	57.5
SOUTH BRANCH	SOUTH BRANCH		Oct-04	66.7	80.5	Х			73.6
SOUTH BRANCH	SOUTH BRANCH		Oct-04	83.3	72.5	Χ			77.9
SOUTH MILL CREEK	SOUTH BRANCH		Jul-03	72.5	86.7	Х			79.6
SPRING RUN	SOUTH BRANCH	1	Jul-03	81.0	57.3		Х		69.2
SPRING RUN	SOUTH BRANCH	2	Jul-03	78.0	63.5		Х		70.8
SPRING RUN	SOUTH BRANCH	3	Jul-03	84.0	68.0	Х			76.0
SPRING RUN	SOUTH BRANCH	4	Jul-03	72.0	72.0	Χ			72.0
SOUTH FORK	SOUTH BRANCH		Oct-04	51.7	74.6		Х		63.2
TOMBS HOLLOW RUN	SOUTH BRANCH			59.0	41.9			Х	50.5
WALNUT BOTTOM	SOUTH BRANCH	1		50.0	51.7			Х	50.9
WALNUT BOTTOM	SOUTH BRANCH	2		58.0	71.2	Х			64.6
BULLSKIN RUN	SHENANDOAH	1	Nov-03		60.6			Х	60.6
BULLSKIN RUN	SHENANDOAH	2	Oct-03		61.4			Х	61.4
BULLSKIN RUN	SHENANDOAH	3	Nov-03		68.0	Х			68.0
EVITTS RUN	SHENANDOAH	1	May-03		53.1			Х	53.1
EVITTS RUN	SHENANDOAH	1	Oct-03		75.2	Х			75.2
EVITTS RUN	SHENANDOAH	2	Oct-03		56.9			х	56.9
EVITTS RUN	SHENANDOAH	3	Oct-03		76.1	Х			76.1
EVITTS RUN	SHENANDOAH	4	Apr-03	65.0	52.0	Ì	х		58.5
EVITTS RUN	SHENANDOAH	4	Oct-03		70.2	Х			70.2
HUBBARDS RUN	SHENANDOAH	1	Nov-03		38.8			Х	38.8
HUBBARDS RUN	SHENANDOAH	2	Apr-03	48.0	29.4			х	38.7
TOTAL	S AND AVERAGES			65.9	65.2	34	20	21	65.6

MARGINAL AND POOR SCORES ARE HIGHLIGHTED

THE MONONGAHELA BASIN

This region of West Virginia has been extensively characterized by volunteer monitors prior to 2002, especially in Monongalia and Preston counties by Downstream Alliance and Friends of Deckers Creek (see the reference section for more information), and has seen sustained volunteer efforts in the West Fork and Tygart Valley over the past several years. In 2003–2004 volunteers monitored 75 stations on a fairly regular basis (Figure 8). Long term and educational monitoring has been going on for many years on Files Creek and the Forks of Sandy Creek. Volunteer data collected from Watkins Run were a major factor for its addition to the presumptive Tier 2.5 list of high quality streams. The habitat and biological integrity rated in the high marginal range and overall 31% of the stations were fully supporting, 36% were partially supporting and 33% were non-supporting. Impacts associated with mining, especially abandoned mines, development and agriculture seem to be the most significant contributors to stream disturbances in this region. Table 5 at the end of this section provides a look at the overall assessment within the basin.

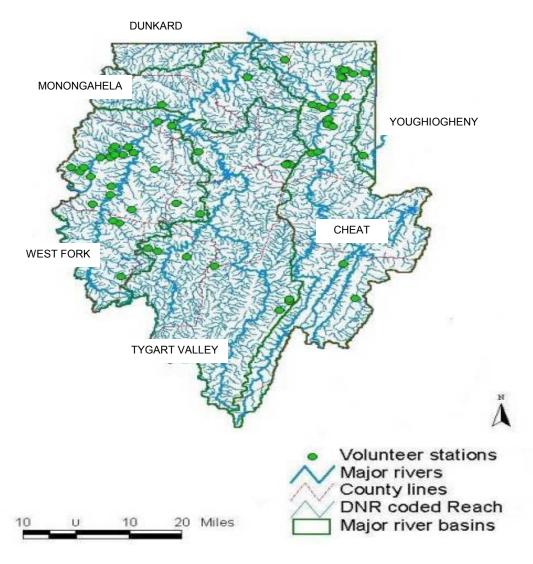


Figure 8. Volunteer Stations in the Monongahela Basin

Volunteer monitoring groups from this region that sent information during this reporting period include Friends of the Cheat, Friends of Deckers Creek, Guardians of the West Fork, Lower West Fork Watershed Association, Aurora Elementary School, Elkins Middle and High School, Trout Unlimited, Buckhannon River Watershed Association, Alderson Broaddus College, Friends of Laurel Mountain and Sandy Pals 4-H Club.

West Fork

The activity in this basin centers largely on the reclamation of impacts associated with polluted coalmine drainage from abandoned mines. Watershed groups active in the basin are the Guardians of the West Fork and the Lower West Fork Watershed Association. The focus of the groups has been slightly different, but their efforts have generated interest from the local communities and resulted in several local projects or project proposals. One of their major partners is the Office of Surface Mining (OSM), which provides funding through the Appalachian Clean Streams Program and interns to watershed groups through the VISTA program. There is more about OSM later in this report.

The Guardians of the West Fork use monitoring as its major tool to show conditions of area streams and rivers. The group has been using advanced techniques for the past several years and has been able to characterize many of the regions waters (Figure 9).

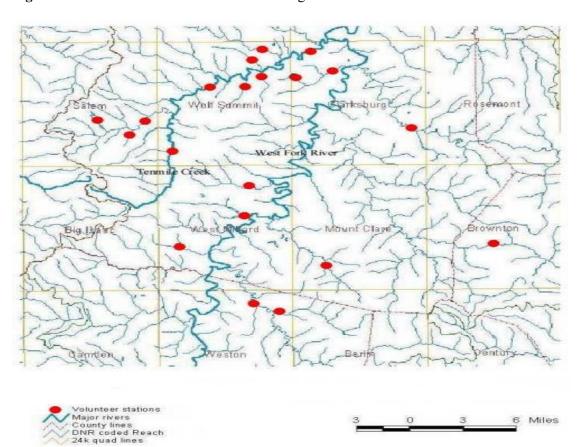


Figure 9. Guardians of the West Fork monitoring stations

This high quality monitoring data has provided the group with focus and drawn in funding from OSM and WV DEP's Nonpoint Source Program. The Guardians, with assistance from Nonpoint field staff have written one of the state's first **watershed based plan** for Lambert's Run. A watershed based plan is probably the most important planning and implementation mechanism available to watershed groups and others interested in the protection and restoration of our water resources. The watershed based plan is specific to each watershed, however certain steps should be considered to help develop your plan. Figure 10 on the next page provides an example of a more technical approach, however the Nonpoint Program can work with you and your partners to help develop your plan.



Members from the Lower West Fork Watershed Association sort macroinvertebrates during a summer workshop on Helen's Run.

The Lower West Fork Watershed Association's strategy has been less technical, but still successful for initiating change and developing watershed based projects. Outreach and education have been their major focus, which includes working with local schools through demonstrations and by hosting the West Fork River Festival. A festival is a unique tool to improve community awareness and have fun. For many groups is a major fund raising mechanism that sustains group activities throughout the year.

Nearly all of the streams monitored by volunteers in this basin exhibited disturbed conditions. Overall average ratings were only marginal for both biological and habitat conditions and only two stations were assessed as fully supporting.

Figure 10. Watershed Planning Flowchart

WATERSHED ASSESSMENT **FOCUSED STUDIES IMPLEMENTATION PLAN** Determine action phase Broad in scope Specific in scope Usually involves field Based on existing info Identify cooperative Does not need to be consultant verification, sample Iterative process: adaptive management strategy landowners for demonstration collection, modeling projects May be consultant driven Historical Conditions Assessment LONG-TERM MONITORING Identify responsible parties, Channel Type Classification Identify limiting factors, cost estimates, permit issues, Hydrology & Water Use existing & potential funding sources Riparian/Wetlands Assessment problems/issues Sediment Sources Assessment Delineate monitoring program Water Quality Assessment Identify & prioritize with goals and objectives Biological Habitat Assessment restoration actions: on-site projects, acquisition Identify and coordinate with Watershed Condition Evaluation possibilities related efforts to avoid > Summarize existing data duplication > Initiate conceptual plans Identify data gaps Identify enhancement Living document – update objectives with changing conditions and Identify initial restoration results from monitoring actions program Prepare for technical studies RESTORATION ACTIONS > Detailed designs & specs; appraisals (grantee responsible for permits & review; if non-profit, can be lead agency) Project construction; land and/or water rights acquisition

> Short-term monitoring

Cheat

The Friends of the Cheat (FOC) is one of the most successful groups in the state over the past several years. Their ability to engage partners and produce high quality information is key to their success. The **River of Promise** is a memorandum of agreement that the partners will work towards the preservation and restoration of the Lower Cheat River Watershed. FOC uses this mechanism to focus on restoration, preservation and education.

FOC have adopted the WV Save Our Streams intermediate and advanced monitoring techniques, and through the assistance of partners at WVU and Downstream Alliance are able to collect water quality information that is analyzed by a certified laboratory and macroinvertebrate samples that are identified to family level. Monitoring efforts are focused on marginal and sub optimal tributaries and are part of the effort to reintroduce native brook trout. Specific project monitoring to record the effects of acid mine drainage remediation on both water quality and biological integrity are also part of their monitoring efforts. A total of 22 stations (Figure 11), including reference sites, are monitored as part of this effort. At each station discharge is measured, invertebrates samples are collected, a visual habitat assessment is performed and water samples are collected for a suite of chemical analysis focusing primarily on parameters associated with mining (Table 4).

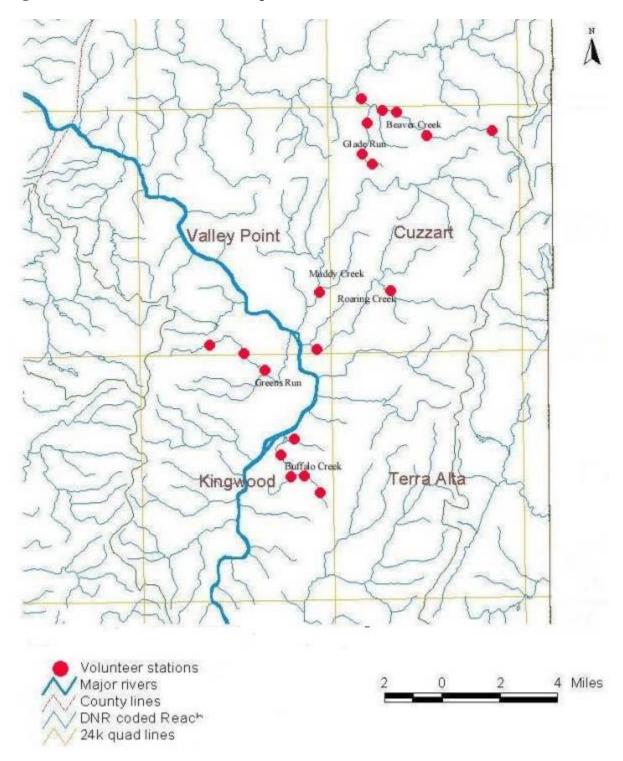
Thus far FOC has seen some improvements in conditions along portions of Beaver Creek, which once held substantial populations of brook trout, and Buffalo Run, which harbors excellent macroinvertebrate populations in some sections but still has certain water quality and habitat issues. Project monitoring on North Fork of Greens Run has shown slight improvements. Through monitoring FOC has been able to locate additional sites in the watershed that may be eligible for project funds. Read more about FOC's activities at http://www.cheat.org/.

Table 4. Results from samples collected at the North Fork of Greens Run project site

STREAM	STATION	DATE	DISCHARGE	рН	ACIDITY	ALKALINITY	MG	CA	FE	AL	MN	SO ₄	DO	COND
NF GREENS RUN	2-1	19-Jul-2003	2279.0	7.6	1.0	16.0	5.73	19.40	0.18	1.03	0.40	57.0		164
NF GREENS RUN	2-2	19-Jul-2003	1988.0	4.6	24.0	1.0	2.16	8.28	0.53	2.41	0.66	36.0		90
NF GREENS RUN	2-3	19-Jul-2003	1077.0	4.3	28.0	1.0	1.85	7.12	0.33	2.25	0.75	32.0		100
NF GREENS RUN	2-1	4-Oct-2003	NA	6.6	1.0	9.0	3.32	13.70	0.41	1.39	0.40	48.0	NA	108
NF GREENS RUN	2-2	4-Oct-2003	NA	4.6	14.0	1.0	1.91	8.45	0.34	1.94	0.58	40.0	NA	89
NF GREENS RUN	2-3	4-Oct-2003	NA	6.7	1.0	12.0	1.40	6.15	0.34	1.69	0.61	37.0	NA	93
NF GREENS RUN	2-1	18-May-2004	5690.0	7.4	1.0	15.0	3.97	17.40	1.34	1.79	0.42	39.0	8.0	145
NF GREENS RUN	2-2	18-May-2004	3469.0	5.3	10.0	1.0	2.15	10.60	3.33	3.04	0.50	33.0	9.0	104
NF GREENS RUN	2-1	9-Sep-2004	3143.4	6.6	0.0	9.5	2.84	13.41	<0.1	<0.1	0.32	22.7	9.0	130
NF GREENS RUN	2-2	9-Sep-2004	2429.4	5.3	0.0	1.8	1.78	10.06	0.12	0.55	0.46	20.6	8.0	104

DISCHARGE = GALLONS/MINUTE; CHEIMCAL ATTRIBUTES EXCEPT FOR CONDUCTIVITY AND PH ARE MEASURED IN MG/LITER

Figure 11. Friends of the Cheat monitoring stations



Tygart Valley

A wide variety of activities associated with volunteer monitoring are occurring in the Tygart Valley Basin. They include using monitoring as part of a science curriculum at middle and high schools, developing and implementing watershed based plans, and targeting select streams as high quality waters that deserve protection. Active groups in this basin include the Buckhannon River Watershed Association, Friends of Laurel Mountain, Sandy Pals 4-H Club and Elkins area high schools and middle schools. In 2004, this basin hosted the National Cannon Envirothon Competition, a high school level competition that focuses on four major areas (soil, aquatics, forestry and wildlife) of our natural resources. The WV Save Our Streams Coordinator has been the aquatics team leader for the past four years. Read more about West Virginia's Envirothon competition at: http://www.wvca.us/envirothon/index.php.

Many high quality waters occur in parts of this basin and remain so due primarily to the protection offered by the resource management practices within the Monongahela National Forest and because much of the region remains heavily forested. However, past mining activity, increased development, acid precipitation, and no buffer protection ordinances have resulted in disturbances to many sub watersheds within this basin.

Overall biological integrity fell in the high marginal range and overall habitat integrity rated suboptimal. When habitat deterioration is not a plausible cause for disturbance to the macroinvertebrate communities, water quality is often a likely candidate.

Sandy Creek and Watkins Run



A Watkins Run native Brook Trout rises for a drifting mayfly.

An excellent example of successful outreach occurred on Sandy Creek, which is located in the southwestern corner of Preston County. Sandy Creek was mined many years ago and although some reclamation took place such as the revegetation of old slag piles and filling in openings, much of the watershed was left untouched. For many years very little life existed in the lower portions of the stream and no one seemed to care until a small watershed group and 4-H club (Friends of Laurel Mountain (FLM) and Sandy Pals 4-H) began to monitor the stream. At first just a few signs of life were encountered, but over the years abundance and diversity has improved and the stream's poor biological integrity rating climbed to marginal and even sub-optimal in certain sections. The focus of this effort has always been on educating the young and showing them the importance of a living stream. Several local school projects have resulted and many county state essay winners have written about the stream. The last school project won recognition at the 2003 WV DNR Youth Conservation Day.

Monitoring information collected by FLM from Watkins Run, a small undisturbed tributary draining to the Cheat River from Laurel Mountain, was key to its addition to the presumptive Tier 2.5 list for high quality waters. Watkins Run is a beautiful cold-water steam protected by mountains and forests on all sides. The stream, however, is 80-90% privately and company owned so there are still threats of logging and quarry operations. Others who supported the protection of Watkins Run and attended Environmental Quality Board (EQB) public meetings include Trout Unlimited, WV Rivers Network, WV Save Our Streams and a majority of the local residents

The Buckhannon Watershed

Often, partnerships and volunteer groups form around education institutions. These types of partnerships offer many types of benefits and in many cases adds credibility to the volunteer efforts. The Buckhannon River Watershed Association (BRWA) is an excellent example of this type of relationship. The association membership includes college students and professors, retired faculty members, agency representatives and members of the local business and professional community. BRWA has written several watershed based plans for restoring streams impaired by polluted coalmine drainage and other forms of acidity (Finks Run, Pecks Run and the Upper Buckhannon Basins). Resources of West Virginia Wesleyan College and the Highlands Institute for Environmental Research are used to assist in the group's efforts to restore, preserve and educate local citizens about the water quality within the basin.

Fecal coliform contamination has been a concern in the Buckhannon River watershed for several years. In 1998 a student and professor at West Virginia Wesleyan College conducted a watershed-wide survey of over 30 locations along the mainstem of the river and many of its tributaries (Long and Simmons, 1998). The most severely contaminated tributaries were located in and around the city of Buckhannon. Since 2001 the Buckhannon Sewer Department has been monitoring fecal coliform levels in the river mainstem in and around Buckhannon and has found that higher flows lead to dramatic increases in coliform concentrations.

In 2003 the BRWA was awarded a Stream Partners Grant to pursue additional coliform testing. The main goal of this sampling was to perform an intensive sampling of a few tributaries to determine whether or not the streams should be categorized as "Impaired" according to state water quality criteria.

The geometric mean of coliform concentrations at each site is shown in Figure 12. West Virginia's water quality regulations state that if the mean coliform concentration (the geometric mean of no less than 5 samples taken during a one-month period) is greater than 200 CFU per 100 ml, then the water body should be considered "Impaired" for recreation and drinking water uses. All seven sampling sites violated state water quality criteria during April 2004.

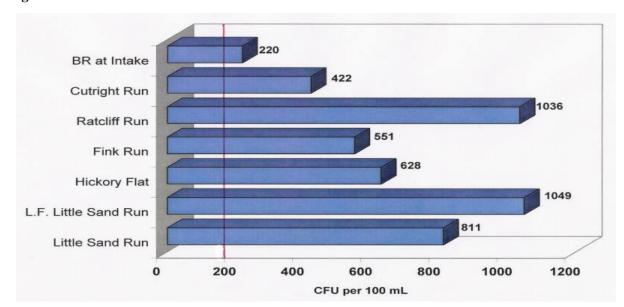
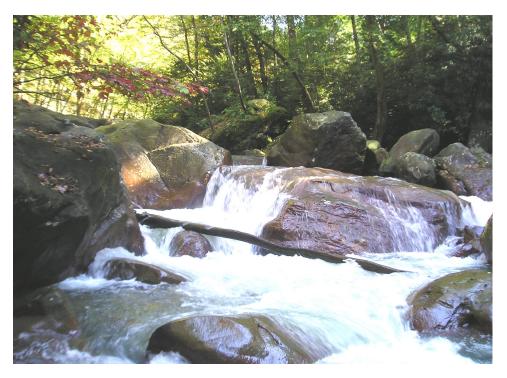


Figure 12. Fecal Coliform concentrations from the Buckhannon River

Monongahela

Deckers Creek

Friends of Deckers Creek (FODC) started out as a sibling association about four years ago encouraged and mentored by the Friends of the Cheat, but they are now a credible organization of their own with a wide variety of partners and successful endeavors. Deckers Creek has some scenic canyons and waterfalls along much of the stream, but the orange stain of past mining has distracted from the scenic beauty of this stream. The orange color can be seen on more than 50% of the stream, all the way to the Monongahela River through Morgantown. The group, however, has not been distracted; they have forged ahead and made progress, mostly through monitoring and outreach, to secure funds for reclamation projects throughout the watershed. FODC has done much of the monitoring themselves but other partners such as West Virginia University, Downstream Alliance (DA), WV Division of Natural Resources, Office of Surface Mining, DEP's Abandoned Mine and Reclamation Sections and others have contributed. The results can be seen in the "AMD in Deckers Creek: What We Know So Far" published by DA in 2002.



Deckers Creek gorge in the upper reaches of the watershed

 Table 5. Monongahela Overall Assessment

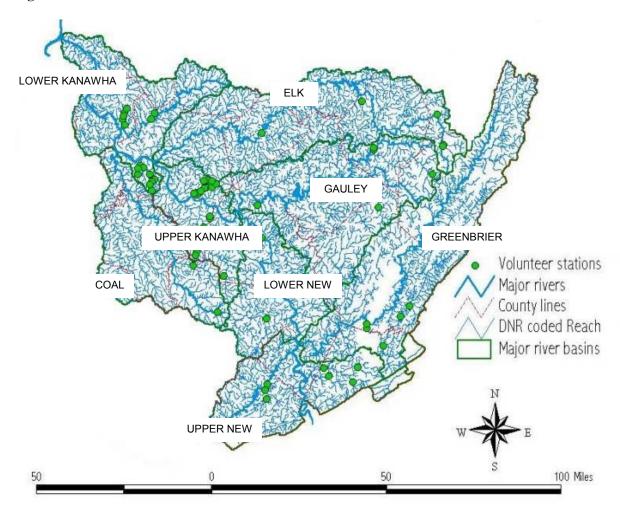
STREAM	BASIN	STATION	DATE	HABITAT	BIOLOGICAL		OVERALL		STATION
STREAM	BASIN	STATION	DATE	ПАВПАТ	BIOLOGICAL	FULLY	PARTIALLY	NON	
BEAVER CREEK	CHEAT	3-1	Aug-03	67.0	57.3		Х		62.2
BEAVER CREEK	CHEAT	3-2	Jul-03	73.0	83.4	х			78.2
BEAVER CREEK	CHEAT	3-3	Jul-03	81.0	71.3	х			76.2
BEAVER CREEK	CHEAT	3-4	Aug-03	35.0	44.4			Х	39.7
BEAVER CREEK	CHEAT	3-5	Aug-03	68.0	50.3		x		59.2
BEAVER CREEK	CHEAT	3-6	Aug-03	64.0	44.9			х	54.5
BEAVER CREEK	CHEAT	3-7	Aug-03	66.0	77.3	х			71.7
BEAVER CREEK	CHEAT	3-1	May-04	74.0	63.2		x		68.6
BEAVER CREEK	CHEAT	3-5	May-04	72.0	82.8	х			77.4
BEAVER CREEK	CHEAT	3-8	May-04	56.0	22.6			Х	39.3
BUFFALO RUN	CHEAT	1-2	Apr-04	54.0	93.8		x		73.9
BUFFALO RUN	CHEAT	1-1	Aug-03	64.0	70.4		х		67.2
BUFFALO RUN	CHEAT	1-2	Aug-03	70.0	89.7	х			79.9
BUFFALO RUN	CHEAT	1-3	Aug-03	64.0	68.7		x		66.4
BUFFALO RUN	CHEAT	1-4	Aug-03	73.0	67.4	х			70.2
BUFFALO RUN	CHEAT	1-5	Aug-03	58.0	61.7			Х	59.9
BUFFALO RUN	CHEAT	1-6	Aug-03	68.0	84.9	х			76.5
BUFFALO RUN	CHEAT	1-7	Jul-03	61.0	73.7		x		67.4
BUFFALO RUN	CHEAT		Oct-04		61.4			х	61.4
BUFFALO RUN	CHEAT	1-1	May-04	55.0	73.0		x		64.0
BUFFALO RUN	CHEAT	1-3	May-04	54.0	64.6			х	59.3
BUFFALO RUN	CHEAT	1-5	May-04	42.0	78.3		Х		60.2
BUFFALO RUN	CHEAT	1-6	May-04	66.0	83.0	х			74.5

STREAM	BASIN	STATION	DATE	HARITAT	BIOLOGICAL		OVERALL		STATION
STRLAW	DASIN	STATION	DAIL	HADHAI	BIOLOGICAL	FULLY	PARTIALLY	NON	
BUFFALO RUN	CHEAT	1-7	May-04	72.0	50.0		х		61.0
GLADY FORK	CHEAT		Aug-04	73.0	86.1	х			79.6
GLADE RUN	CHEAT	4-1	Jul-03	43.0	31.3			х	37.2
GLADE RUN	CHEAT	4-2	Jul-03	29.0	33.0			Х	31.0
GLADE RUN	CHEAT	4-3	Jul-03	34.0	43.9			х	39.0
GLADE RUN	CHEAT	4-2	May-04	42.5	48.2			х	45.4
GLADE RUN	CHEAT	4-3	May-04	36.0	42.5			х	39.3
MUDDY CREEK	CHEAT	1	Jun-03	75.0	81.3	х			78.2
NF GREENS RUN	CHEAT	2-1	Jul-03	73.0	47.4	х			60.2
NF GREENS RUN	CHEAT	2-2	Jul-03	79.0	68.4	х			73.7
NF GREENS RUN	CHEAT	2-3	Jul-03	83.0	51.4		x		67.2
NF GREENS RUN	CHEAT	2-1	May-04	50.0	43.8			х	46.9
NF GREENS RUN	CHEAT	2-2	May-04	36.0	51.1			х	43.6
ROARING CREEK	CHEAT	1	Jun-03	41.3	78.2		x		59.8
ROARING CREEK	CHEAT	2	Jul-03	68.0	82.6				75.3
WATKINS RUN	CHEAT	1	May-03	87.0	80.7	х			83.9
WATKINS RUN	CHEAT	2	Aug-03	81.0	75.3	х			78.2
WATKINS RUN	CHEAT	2	Aug-04	96.0	76.0	х			86.0
LEADING CREEK	TYGART VALLEY			57.0	71.5		х		64.3
LF FILES CREEK	TYGART VALLEY		Jun-04	68.8	77.7	х			73.3
LF FILES CREEK	TYGART VALLEY		May-04	66.7	66.0	х			66.4
LF FILES CREEK	TYGART VALLEY		May-03	66.7	68.6	х			67.7
LB/LF SANDY CREEK	TYGART VALLEY	1	Jun-04	52.5	73.2		х		62.9
LB/LF SANDY CREEK	TYGART VALLEY	1	Jul-03	56.7	57.1			Х	56.9
LB/LF SANDY CREEK	TYGART VALLEY	2	Aug-04	52.5	78.9		х		65.7
LF SANDY CREEK	TYGART VALLEY		Jul-03	33.3	54.1			Х	43.7
LF SANDY CREEK	TYGART VALLEY		May-03	45.0	53.4			х	49.2
MILLSTONE CREEK	TYGART VALLEY		May-04	91.7	63.6		х		77.7
MILLSTONE CREEK	TYGART VALLEY		May-03	91.7	80.0	х			85.9
RB/LK SANDY CREEK	TYGART VALLEY	2	Jun-04	72.5	53.3		х		62.9
RB/LF SANDY CREEK	TYGART VALLEY	2	May-03	50.0	62.1			Х	56.1
RB/LF SANDY CREEK	TYGART VALLEY	2	Jul-03	74.0	51.1		Х		62.6
RB/LF SANDY CREEK	TYGART VALLEY	1	Aug-04	72.5	45.5		Х		59.0
UNT MIDDLE FORK RIVER	TYGART VALLEY		Jul-04	71.0	45.0		Х		58.0
BOOTH CREEK	WEST FORK		Jul-03	48.0	75.9		Х		62.0
BRUSHY FORK	WEST FORK		Jul-03	74.5	55.5		Х		65.0
ELK CREEK	WEST FORK		Mar-04	62.0	67.0		х		64.5
HELENS RUN	WEST FORK		Aug-04	41.7	62.1			Х	51.9
ISAACS CREEK	WEST FORK		Jul-03	63.0	57.9			х	60.5
KINCHELOE CREEK	WEST FORK		Jul-03	55.5	70.3		Х		62.9
LAMBERTS RUN	WEST FORK		Jun-03	83.0	27.7		х		55.4
SALEM FORK	WEST FORK		May-03	64.0	53.3			Х	58.7
SKIN CREEK	WEST FORK		Apr-03	54.0	59.7			х	56.9
TENMILE CREEK	WEST FORK		Sep-03	56.5	65.4		Х		61.0
TWO LICK CREEK	WEST FORK		Jul-03	69.5	70.7	Х			70.1
UNT LAMBERTS RUN	WEST FORK		May-03		0.0			х	0.0
RHINE CREEK	YOUGHIOGHENY		Apr-03	80.0	72.0	х			76.0

MARGINAL AND POOR SCORES ARE HIGHLIGHTED

THE KANAWHA BASIN

Figure 13. Volunteer stations in the Kanawha Basin



This region of West Virginia also has had consistent and sustained volunteer monitoring over the past several years. In 2003–2004 volunteers monitored 53 stations at least once (Figure 13), and about 30% of these stations were monitored on multiple occasions, usually in the spring and fall. Most of the monitoring took place in the Upper and Lower Kanawha Basins. The habitat and biological integrity rated marginal and overall 30% of the stations were fully supporting, 42% were partially supporting and 28% were non-supporting. However, several very high quality streams are located in this region. Table 8 at the end of this section provides a look at the overall assessment within the basin.

Impacts associated with major resource extraction activities such as mining, logging and oil and gas well development were major contributors to stream impacts. Additionally there were many impacts associated with development such as impervious surfaces (parking lots, roads etc.), channel modifications, urban and sub urban sprawl and inadequate sewage in some parts of the basin. Agricultural impacts were somewhat limited in this region, except for the Upper New River and Greenbrier Basins.

Volunteer monitoring groups from this region that sent information during this reporting period include the Heizer-Manila Watershed Organization, Lower Paint Creek Watershed



HMWO collects macroinvertebrates from their reference stations above the mine drainage impacts.

Association, Lower Greenbrier Watershed Association, Indian Creek Watershed Association, Pikeview High School, Oak Hill Catholic Center, Kelly's Creek Community Association, Morris Creek Watershed Association, Trout Unlimited and the Elk Headwaters Association.

Upper and Lower Kanawha

Several groups have been monitoring streams in this basin for extended periods with some success and frustration. We often measure success in water quality by our ability to show improvements. Many of the streams in this region have not dramatically improved but have either remained the same, or in some cases degraded even further. Possibly, an alternate measure of success could be based upon the level of effort and commitment towards our goals, even though these goals are often not met in what some feel is a timely manner. This section briefly highlights several active groups from this basin.

Heizer Creek

Heizer and Manila Creeks have resided on the 303(d) list for many years and other than maintenance checks on a few portals due to safety risks, no water quality implementation plans have been attempted by the state agencies. However, TMDL monitoring has occurred over the past year for metals (aluminum, iron and manganese) and pH by the Watershed Assessment Section. This information is complimented by the efforts of the Heizer-Manila Watershed Organization (HMWO) who in 2004 submitted data that was accepted as credible enough to be included for 303(d) purposes. TMDL development, which includes data analysis, modeling and reporting for Heizer Creek is scheduled for 2005. HMWO has not waited on the state to act but have been experimenting with pilot wetlands in an attempt to reduce the metal loads on select small tributaries. There have been some successes but due to intense precipitation over the past several years; these small wetlands have not been able to maintain enough storage time for load reductions.

In addition to being involved in intense monitoring, HMWO is also one of the few groups certified to teach level one WV Save Our Streams classes and is able to use this certification as a mechanism to encourage schools and local 4-H groups to participate in stream related activities. Other than monitoring, HMWO completes regular trash collections and has recently completed an extensive willow planting effort to help restore eroded streambanks.

The efforts of HMWO have not gone unnoticed. They have been awarded for several accomplishments at Watershed Celebration Day and through the local Conservation Districts.

Davis Creek

The Davis Creek Watershed Association (DCWA) has had some setbacks in 2003 and 2004 due mainly to devastating flooding within the watershed. Extreme rains resulted in some of the highest water levels in more than 20 years. Much of the group's equipment and survey data was damaged so the information recorded was lost. However, like most of the volunteer groups in West Virginia, Davis Creek did not give up, and with assistance from DEP a major clean up was undertaken. Volunteers from Charleston area DEP offices, local residents and volunteers from the watershed association participated.

Even though recent monitoring information was lost, from 1996-2002 the group has successfully documented the increased erosion, increased sedimentation and changes to the macroinvertebrate communities that have occurred. Parts of the stream's headwaters are relatively well protected due to its beginnings in Kanawha State Forest, but even increased use of this facility has had impacts on the upper stream reaches. The most dramatic impacts are from the development of the shopping centers of Southridge and Shops at Trace Fork along Corridor G. Development of these large shopping, restaurant and entertainment complexes continues to proceed. High levels of embeddedness, or in some cases complete burial of riffle habitat in Trace Fork, is just one example of the impacts.

Paint Creek

Volunteer monitoring on Paint Creek's stream has been very site specific, focusing on bank and structure repair projects. WV Save Our Streams provided assistance with the planning, permit requirements and monitoring of two projects on the stream. The project on Ash Branch, a small cold-water tributary located about midway within the watershed is discussed here.

Early in 1994-1995 Trout Unlimited (TU) placed K-dams, also called splash-dams, in Ash Branch. The structures were designed to create pools to improve the habitat of the stream for trout. In addition to the structures, fingerling brown, brook and rainbow trout were introduced to the stream.



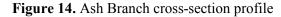
The arm of the K-Dam has collapsed resulting in bank erosion adjacent to the structure as well as further downstream.

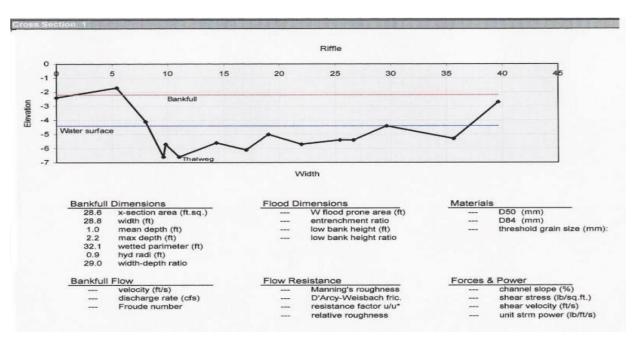
The integrity of these structures survived for many years, however, the consistent storm flows over the last several years (rainfall was 22% above normal in 2002-2004) compromised structures in the lower reaches causing extensive erosion and channel widening. Mitigation money became available to the Lower Paint Creek Watershed Association (LPCWA) through its association with TU. Together, the groups decided to use the money to repair the structures. WV Save Our Streams encouraged TU and LPCWA to design a monitoring plan so that changes to the channel, sedimentation and biological integrity could be tracked.

The monitoring plan incorporates the use of certain channel classification measurements (Rosgen,

1998), such as cross-section and longitudinal profiles in reference areas and in the project areas and pebble counts to capture changes to the surface sediment. In addition, the standard stream assessment methods from the WV Save Our Streams program will be part of the monitoring scheme.

The project has proceeded somewhat slowly, but some initial channel data (Figure 14) has been collected and permits have been approved. Repair and construction as well as additional monitoring should begin in the spring or summer of 2005.





Morris Creek

Morris Creek is located on the Fayette/Kanawha County lines and is another stream that has been dramatically impacted by polluted coalmine drainage from abandoned mines. The Morris Creek Watershed Association (MCWA) is the local guardian and they have had great success with outreach in the local community and in developing partnerships with DEP's Stream Restoration Group, Abandoned Mine and Reclamation Section, Nonpoint Program, Office of Surface Mining, National Hummer Club, WV Tech and Marshall University just to name a few.



Morris Creek community members demonstrate kicknet washing 101 during a summer stream-monitoring workshop in the headwaters of Morris Creek.

MCWA is currently working on a watershed based plan that will remediate much of the mine drainage. They are also working on establishing an education center and continuing outreach through stream-monitoring using Hummers to gain access to headwater areas and to offer tours within the watershed. John King, an environmental science major at Marshall University is a member of the association and is currently working on his masters using the WV Save Our Streams protocols as his guide.

In addition to the mine drainage treatment the MCWA will also include a **sediment monitoring program** as part of its watershed based plan, using methods designed for volunteers by WV Save Our Streams. The methods are similar to those described previously for the Ash Branch project.

Upper Elk River

The **Kanawha Valley Chapter of Trout Unlimited** has adopted the WV Save Our Streams protocols and has begun to incorporate a long-term monitoring program with their regular trout stocking and outreach programs. Its mission to "conserve, protect and restore North America's trout and salmon fisheries and their watersheds" makes TU an excellent partner for WV Save Our Streams and many other organizations. Their members bring a great deal of knowledge and expertise about natural stream conditions and are committed to their mission.

In West Virginia, several chapters have had training, but thus far the Kanawha Valley Chapter is the only one who has a specific monitoring plan. TU's focus is the Upper Elk Watershed, one of the most pristine watersheds in our state. The area is nationally recognized for its trout fishing opportunities, abundance of outdoor recreation and its scenic beauty. The local residents feel that protection and preservation seems to be

secondary, even though the quality of the land and water is the reason for the interest in the first place.



Members of TU and EHA participate in a Level three stream-monitoring workshop on a "very warm" spring Saturday.

Using the advanced WV Save Our Streams techniques, TU has an ambitious schedule targeting the mouths of select tributaries and sections of the main stream on the Upper Elk River. Figure 15 depicts monitoring results over the last several years. Its partner in the region is the **Elk Headwaters Association** (EHA). EHA helps to organize monitoring related and other watershed outreach activities in the region. In addition to the procedures adopted, TU also incorporates a unique sediment monitoring procedure designed by the US Forest Service (USFS).

Studies on western mountain streams suggest that interstitial sediments finer than 4 mm reduce the permeability of the gravel and can impair the inter-gravel water flow needed to provide oxygen and remove metabolic wastes from trout embryos.

The embryos can successfully hatch into alevins (fry), but they are unable to migrate upwards through the gravel to emerge because the inter-gravel pores are blocked. Mortality increases as the percentage of materials less than 4 mm increase. The USFS estimates that percentages of ≥ 30% impact the success of trout spawning in eastern streams. Thus far data has been collected by TU and the USFS since 1997. This type of monitoring may help focus attention on the area's unique resources and could be a valuable component of a monitoring plan, if the appropriate quality assurance and quality control (QAQC) procedures are written. Table 6 provides a summary of select stations.

Table 6. Interstitial sediment analysis on Upper Elk tributaries

Stations	1997	1998	1999	2000	2001	2002	Overall Average
Big Run (below Slaty Fork)	26.0	24.0	31.5	29.8	No data	25.6	27.4
Big Run (below Whittaker Falls)	37.0	27.0	34.8	26.7	No data	21.4	29.4
Chimney Rock Run	27.0	26.0	34.4	31.2	No data	30.2	29.8
Laurel Run	20.0	29.0	30.8	35.5	32.3	45.7	32.2
Props Run	30.0	29.0	40.4	36.9	35.0	38.3	34.9
Rose Run	29.0	38.0	41.3	39.8	No data	39.2	37.5

TU has also been collecting water quality data that includes pH, temperature, a visual estimation of turbidity and iron and an estimation of water level (flow). They have an extensive database with more than 900 entries since 1979. The portion from 2003-2004 is included in appendix 10.

Figure 15. Results from the TU monitoring stations

Station one-two is located on the upper Elk River mainstem in the catch-and-release area, station three is at the mouth of Big Spring Fork and station four is near the mouth of Old Field Fork. The Elk River begins at the confluence of Old Field and Big Spring. Station five is much further downstream on Camp Creek.

Lower Coal River

The Coal River Group formed in late 2003 focusing on the lower sections of the Coal River from Tornado to its confluence with the Kanawha River. The group's mission is to encourage use of the river and promote its history and recreational opportunities. During meetings with state officials the group asked if the river was safe for swimming. Representatives from DEP and the Department of Health and Human Resources (DHHR) could not answer with 100% certainty, so the group decided to try and find out for themselves.

Money was raised to pay a private contractor and with volunteer effort and public service district cooperation, coliform samples were collected during the 2004 summer season. A majority of these samples did not show levels exceeding standards. The group plans to collect samples in the future as part of their monitoring plan.

New River

Laurel and Wolf Creeks

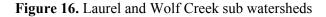
Plateau Action Network is continuing its assessment of these watersheds using a unique approach. Essentially, a consultant is completing the work, but in this case the consultant is a middle school science class from Oak Hill Catholic Center. The students collect water quality samples from three locations in the headwaters of Wolf Creek near outfalls from abandoned mines. The students also perform an intermediate level stream assessment at the mouth of Wolf Creek and the same assessment at a station on Laurel Creek. Laurel Creek was chosen as the reference (control) site for this study. The watershed boundaries border each other and both have similar characteristics (Figure 16).

Wolf Creek is impaired in the upper reaches for pH and metals and there is biological impairment throughout most of its length. Laurel Creek has similar impacts, but strong liming treatment has been successful. Much of the stream has optimal or suboptimal biological integrity and water quality that



Students prepare to measure a crosssection and discharge during an early fall workshop near the mouth of Wolf Creek.

overall, does not violate standards. There are some habitat impacts from erosion and sedimentation. Table 7 provides the most recent water quality data collected from Wolf Creek and the remaining information can be found on the overall assessment table and in the appendices.



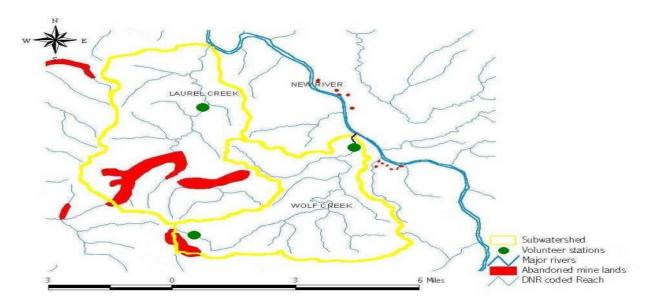


 Table 7. Water quality results from Wolf Creek mine drainage

SSPP WOLF CREEK 1					
ANALYSES	RESULTS	UNITS	MDL	DATE	ANALYST
PH	6.12		E150.1	30-Oct-03	JLM
TOTAL METALS			E200.7	23-Oct-03	JD
ALUMINUM	0.99	MG/L			
IRON	0.82	MG/L			
MANGANESE	1.45	MG/L			
DISSOLVED METALS			E200.7	23-Oct-03	JD
ALUMINUM	0.06	MG/L			
IRON	0.62	MG/L			
MANGANESE	1.47	MG/L			
SULFATE	115	MG/L	E300.0	23-Oct-03	LK
ANALYSES	RESULTS	UNITS	MDL	DATE	ANALYST
TURBIDITY	2.21	NTU	SM2130B	23-Oct-03	TS
TOTAL ACIDITY	15.8	MG/L	SM2310B	30-Oct-03	JLM
ALKALINITY	5.4	MG/L	SM2320B	30-Oct-03	JLM
SSPP WOLF CREEK 2		•			
ANALYSES	RESULTS	UNITS	MDL	DATE	ANALYST
PH	4.05		E150.1	30-Oct-03	JLM
TOTAL METALS			E200.7	23-Oct-03	JD
ALUMINUM	5.42	MG/L			
IRON	9.92	MG/L			
MANGANESE	2.53	MG/L			
DISSOLVED METALS			E200.7	23-Oct-03	JD
ALUMINUM	5.27	MG/L			
IRON	2.77	MG/L			
MANGANESE	2.58	MG/L			
SULFATE	203	MG/L	E300.0	23-Oct-03	LK
TURBIDITY	40.6	NTU	SM2130B	23-Oct-03	TS
TOTAL ACIDITY	75.9	MG/L	SM2310B	30-Oct-03	JLM
ALKALINITY	ND	MG/L	SM2320B	30-Oct-03	JLM
SSPP WOLF CREEK 3	•		•	•	
ANALYSES	RESULTS	UNITS	MDL	DATE	ANALYST
PH	2.91		E150.1	30-Oct-03	JLM
TOTAL METALS			E200.7	23-Oct-03	JD
ALUMINUM	46.4	MG/L			
IRON	304	MG/L			
MANGANESE	16.9	MG/L			
DISSOLVED METALS			E200.7	14-Nov-03	JD
ALUMINUM	45.8	MG/L			
IRON	316	MG/L			
MANGANESE	16.8	MG/L			
SULFATE	1960	MG/L	E300.0	22-Oct-03	JD
TURBIDITY	10.9	NTU	SM2130B	22-Oct-03	KS
TOTAL ACIDITY	305	MG/L	SM2310B	30-Oct-03	JLM
ALKALINITY	ND	MG/L	SM2320B	23-Oct-03	JLM

Analyses completed by REI Consultants Inc. Lab Order #: 0310823 Collection Date: 10/21/03

Table 8. Kanawha Overall Assessment

OTDEAN	DACINI	0.7.4.7.0	DATE	LIADITAT	iniol color:		OVERALL		0.14.710.1	INTEGRITY
STREAM	BASIN	STATION	DATE	HABITAT	BIOLOGICAL		PARTIALLY	NON	STATION	INTEGRITY
CLEAR FORK	COAL		Apr-04	36.7	70.0	. 022.	X		53.4	MARGINAL
BIG SPRING FORK	ELK	1	Jul-04	68.5	78.6	Х			73.6	SUB OPTIMAL
CAMP CREEK	ELK	1	Jun-04	72.5	72.5	Х				SUB OPTIMAL
OLD FIELD FORK	ELK	1	Apr-04	79.5	91.2	Х			85.4	OPTIMAL
ELK RIVER	ELK	1	Oct-03	80.0	90.4	Х			85.2	OPTIMAL
ELK RIVER	ELK	1	Oct-04	84.7	88.8	Х			86.8	OPTIMAL
ELK RIVER	ELK	2	Aug-04	63.3	78.4		Х		70.9	SUB OPTIMAL
ELKLICK RUN	GAULEY		Oct-04	66.0	86.2	Х			76.1	SUB OPTIMAL
RICH CREEK	GAULEY		Mar-03	66.7	72.7	Х			69.7	SUB OPTIMAL
UPPER GLADE RUN	GAULEY	1	Apr-04	57.5	75.3		Х		66.4	SUB OPTIMAL
UPPER GLADE RUN	GAULEY	2	Jun-04	43.8	66.2		Х		55.0	MARGINAL
UPPER GLADE RUN	GAULEY	3	Jun-03	49.0	65.5		Х		57.3	MARGINAL
HARTS RUN	GREENBRIER		Feb-04	61.0	78.9	Х			70.0	SUB OPTIMAL
GREENBRIER RIVER	GREENBRIER		Jul-04	58.3	66.0	Х			62.2	MARGINAL
SECOND CREEK	GREENBRIER		Jul-04	75.0	66.4	Х			70.7	SUB OPTIMAL
SECOND CREEK	GREENBRIER		Jul-03	76.7	77.1	Х			76.9	SUB OPTIMAL
MANILA CREEK	KANAWHA	7	Jul-03	68.0	49.8		Х		58.9	MARGINAL
MANILA CREEK	KANAWHA	6	Apr-03	59.0	0.0			Х	29.5	POOR
MANILA CREEK	KANAWHA	5	Apr-03	52.0	0.0			Х	26.0	POOR
MANILA CREEK	KANAWHA	4	Jul-03	53.0	0.0			Х	26.5	POOR
MANILA CREEK	KANAWHA	3	Jul-03	54.0	0.0			X	27.0	POOR
MANILA CREEK	KANAWHA	2	Jul-03	62.0	0.0			X	31.0	POOR
MANILA CREEK	KANAWHA	1	Jul-03	48.0	0.0			X	24.0	POOR
MANILA CREEK	KANAWHA	7	Apr-03	67.0	50.9		Х		59.0	MARGINAL
		,	Oct-03	58.3	67.9		X		63.1	MARGINAL
MANILA CREEK	KANAWHA		May-03	56.7	56.9		Λ	Х	56.8	MARGINAL
POCATALICO RIVER	KANAWHA		Aug-03	57.0	58.1			X	57.6	MARGINAL
TRACE FORK	KANAWHA		Apr-03	58.0	88.9		X	^	73.5	SUB OPTIMAL
ASH BRANCH	KANAWHA	4	•				^	Х		
FIVEMILE FORK	KANAWHA	1	Jul-03 Jul-03	51.0	60.6			X	55.8 60.2	MARGINAL MARGINAL
FIVEMILE FORK	KANAWHA	2		56.0	64.4	~		^		SUB OPTIMAL
FROZEN BRANCH	KANAWHA	1	Jul-03 Jul-03	68.0 74.0	67.2 67.1	X				SUB OPTIMAL
GOOSE HOLLOW	KANAWHA	2				^		Х	47.0	POOR
GOOSE HOLLOW	KANAWHA		Jun-03	34.0	60.0			^		
HICKS HOLLOW	KANAWHA		Jun-03		68.5		Х	· · ·	54.8	MARGINAL
HORSEMILL BRANCH	KANAWHA		Jul-03	49.0	45.1			X	47.1	POOR
HURRICANE FORK	KANAWHA		Jun-03	48.0	32.5			Х	40.3	POOR
KELLYS CREEK	KANAWHA	1	Jul-03	58.0	71.2		Х		64.6	MARGINAL
KELLYS CREEK	KANAWHA	2	Jul-03	45.0	56.8			Х	50.9	MARGINAL
KELLYS CREEK	KANAWHA	3	Jul-03	67.0	55.7		Х		61.4	MARGINAL
KELLYS CREEK	KANAWHA	4	Jun-03	59.0	65.4		Х		62.2	MARGINAL
KELLYS CREEK	KANAWHA		Jun-03	66.0	54.1		Х		60.1	MARGINAL
MORRIS CREEK	KANAWHA		Sep-04	48.8	74.5	Х			61.7	MARGINAL
MORRIS CREEK	KANAWHA	15	Nov-04	68.3	61.7		Х		65.0	SUB OPTIMAL
MORRIS CREEK	KANAWHA	7	Nov-04	83.5	59.8		Х		71.7	SUB OPTIMAL
UNT LEFT FORK	KANAWHA		Jul-03	79.5	51.3		Х		65.4	SUB OPTIMAL
WILLIS BRANCH	KANAWHA		Jul-03	64.0	76.2		Х		70.1	SUB OPTIMAL
LAUREL CREEK	NEW RIVER		Oct-03	83.3	68.5		Х		75.9	SUB OPTIMAL
WOLF CREEK	NEW RIVER		May-04	37.0	71.7			Х	54.4	MARGINAL

STREAM	BASIN	STATION	DATE	HARITAT	BIOLOGICAL		OVERALL		STATION	INTEGRITY
OTALAW	BAOII	OTATION	DATE	ואטוואו	DIOLOGIOAL	FULLY	PARTIALLY	NON	OTATION	INTEGRATI
BRUSH CREEK	NEW RIVER	2	Oct-04	41.0	28.1		Х		34.6	POOR
BRUSH CREEK	NEW RIVER	1	Apr-03	52.0	72.9	Χ			62.5	SUB OPTIMAL
DROOPING LICK CREEK	NEW RIVER		May-04	75.0	55.3		Χ		65.2	SUB OPTIMAL
HANS CREEK	NEW RIVER		Oct-03	55.0	76.4		Χ		65.7	MARGINAL
INDIAN CREEK	NEW RIVER		Sep-03	79.0	67.0	Χ			73.0	SUB OPTIMAL
OVERALL AVE	RAGES AND T	OTALS		60.7	59.0	16	22	15	59.8	

MARGINAL AND POOR SCORES ARE HIGHLIGHTED

THE OHIO BASINS

This section will discuss volunteer activities within the Upper and Lower Ohio Basins. Many of the streams that empty directly into the Ohio have not been monitored by volunteers due to the difficulties associated with the biological assessment of their low gradients (lack of riffle/run habitats). At times WV Save Our Streams has provided equipment and training to help volunteer monitoring groups adapt to these stream types, but there has been a limited acceptance except at certain middle and high schools. However, not all the streams lack riffles and run habitats (especially many streams within the Lower Ohio Basin), so many can still be assessed using the primary program methods. Figure 17 shows the stations within the Lower Ohio Basin.

LOWER GUYANDOTTE

TUG FORK

Volunteer stations.shp
Major rivers
County lines
DNR coded Reach3 hydrology
Major river basins

Figure 17. Volunteer stations in the Lower Ohio

Volunteer monitoring groups from the Upper and Lower Ohio region that sent information during this reporting period include the Upper Guyandotte Watershed Association, Elkhorn Creek Watershed Association, Cabell Midland High School, Trout Unlimited, Shady Springs High School, Gilmer County Watershed Coalition, Marshall University, Glenville State College, Ralph R. Willis Technical Center, Roane-Jackson Technical Center and Cumberland High School. There are also several schools that have active programs but did not send any information during this reporting period.

Lower Ohio

This region is characterized primarily by impacts associated with major resource extraction activities, namely mining, logging and oil and gas well roads. These activities have left many of the steep mountainsides with scars. The abandoned roads and sliding hillsides are contributors to the habitat deterioration (73% of the streams assessed had marginal habitat scores).



Often, even short storm events result in fast run-off and high stream turbidity.

Biological conditions were slightly better; due mostly to relatively cool water and high dissolved oxygen associated with the steep mountain terrain. Much of the coal mined in this region is low in sulphur content, so when exposed to water and oxygen the resulting acidity is low. However, biological impairments due to high concentrations of dissolved metals, sedimentation and contamination from sewage are common throughout much of the region. The methods used by the volunteer monitoring groups in this region are not stringent enough to distinguish the changes in the benthic invertebrate communities; however, the biological integrity conditions are well documented by WAS.

Table 9 on the next page provides a look at the overall assessment results from streams surveyed within the region. Volunteer activities are making a difference in the region and the community is beginning to recognize the importance of good water quality for healthy lives, a healthier environment and for providing financial benefits (i.e. tourism from trout fishing). OSM and the VISTA Program have provided funding for internships for both the Elkhorn Creek Watershed Association and the Upper Guyandotte Watershed Association for the past several years. Also a new chapter of Trout Unlimited has formed and is beginning to bring attention to the area's fisheries, focusing on the Upper Guyandotte and Tug Fork basins.

Table 9. Lower Ohio Overall Assessment

STREAM	BASIN	STATION	DATE	HARITAT	BIOLOGICAL		OVERALL		STATION	INTEGRITY
OTTAL/ IIII	Влюпч	017111011	Ditte	I I/ (BIT/ (T			PARTIALLY			INTEGRATI
BARKERS CREEK	GUYANDOTTE		May-03	52.0	56.9			Х	54.5	MARGINAL
CABIN CREEK	GUYANDOTTE		Jul-03	73.3	74.3	Х			73.8	SUB OPTIMAL
DEVILS FORK	GUYANDOTTE		Jul-03	66.7	75.7	Х			71.2	SUB OPTIMAL
GUYANDOTTE RIVER	GUYANDOTTE		Sep-03	63.0	70.5		Х		66.8	SUB OPTIMAL
SLAB FORK	GUYANDOTTE	1	Jul-03	65.0	72.9	Х			69.0	SUB OPTIMAL
SLAB FORK	GUYANDOTTE	1	Oct-04	60.0	70.4		Х		65.2	SUB OPTIMAL

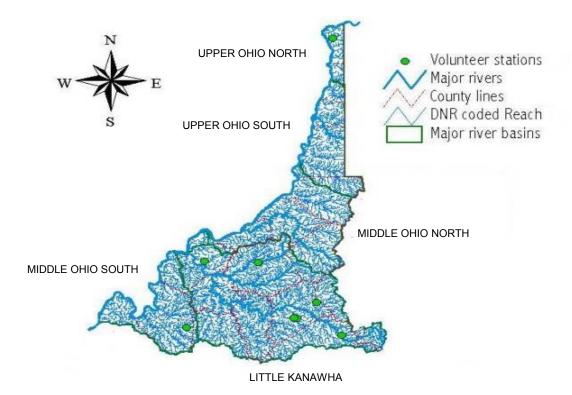
STREAM	BASIN	STATION	DATE	HARITAT	BIOLOGICAL		OVERALL		STATION	INTEGRITY
OTALAW	BAOIN	OTATION	בו	IIADITAT	BIOLOGIOAL	FULLY	PARTIALLY	NON	OTATION	INTEGRATI
BRADSHAW CREEK	TUG FORK	2	Mar-03	50.0	62.9			Х	56.5	MARGINAL
BRADSHAW CREEK	TUG FORK	1	Mar-03	50.0	68.6		Х		59.3	MARGINAL
DRY FORK	TUG FORK		Apr-03	66.7	62.9		Х		64.8	MARGINAL
ELKHORN CREEK	TUG FORK		Mar-03	58.3	62.9			Х	60.6	MARGINAL
TWIN BRANCH	TUG FORK		Oct-03	50.0	70.0		Х		60.0	MARGINAL
				59.5	68.0	3	5	3	63.8	MARGINAL

MARGINAL AND POOR SCORES ARE HIGHLIGHTED

Upper Ohio

Historically, volunteer monitoring activity has been limited in this region due mostly to the nature of the streams as explained earlier (Figure 18). However, with a targeted, very focused approach using hands-on education and outreach and pilot or demonstration projects, an increase in interest and participation could be accomplished.

Figure 18. Volunteer stations in the Upper Ohio



A good example of a focused effort is the formation of the Sand Fork Technical Committee (SFTC). SFTC is working towards characterizing the streams within the Sand Fork sub watershed in the hopes to better understand the sources of the metal contamination, and to implement future projects that will address the needs of the community and implement the recommendations of the TMDL. Members of SFTC include DEP's Nonpoint and Watershed Assessment Section, WV Conservation Agency, U.S. Army Corps of Engineers, Canaan Valley Institute, Glenville State College, Gilmer County Watershed Coalition, and the Cedar Creek Community Association. Future partners are anticipated and may include of the Office of Emergency Services and U.S. Geological Service.



The Sand Fork proposed project site "Rocky Run."

The committee has been using very sophisticated GIS and satellite imagery to interpret the conditions of the landscape to help target possible project and reference locations. Public meetings have been held on several occasions within the watershed to explain the group's intensions and to solicit information and landowner support. Finally, select members of the committee have been participating in the fieldwork associated with channel characterization.

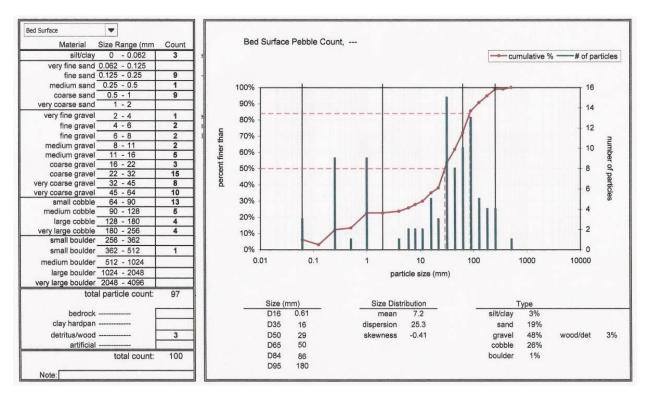
Rocky Fork has been selected as a probable project location. The upper portion of this small watershed is forested but there are impacts from logging, pasturelands and general encroachment upon the stream. The lower portion of the stream flows through pasturelands with very little buffer protection, as well as downstream

channel restrictions from a local road and bridge. The stream has widened and incised dramatically and the banks are high and extremely eroded. The site was chosen due primarily to landowner cooperation and its location within the watershed.

The project will improve the stability of the channel and slow erosion, thereby reducing the sediment load, and possibly the metal load, entering the stream. The group believes that the nature of the soils in the watershed and their metal content are a major contributor to the elevated metal concentrations found throughout the watershed. Figure 19 shows the results of pebble count date collected from Rocky Run.

The group is also investigating the cost and logistics of installing a stream gage near the mouth of Sand Fork to further characterize bankfull flows and act as a possible warning system for high water events.

Figure 19. Pebble count data collected from Rocky Fork, Gilmer County



Very few stream surveys were received from this region (Table 10), but overall a majority of the streams were fully supporting (57%). Biological impairments were common, and many of these are believed to be associated with sedimentation and high percentages of embeddedness.

Table 10. Upper Ohio Overall Assessment

STREAM	BASIN	STATION	DATE	HARITAT	BIOLOGICAL		OVERAL		STATION	INTEGRITY
OTAL/ W	BACHT	017111011	DATE	II/(BII/(I			PARTIALLY			INTEGRATI
CEDAR CREEK	LITTLE KANAWHA		Sep-03	76.0	65.1	Х			70.6	SUB OPTIMAL
CEDAR CREEK	LITTLE KANAWHA		Apr-03	70.0	72.1	Х			71.1	SUB OPTIMAL
ELLIS CREEK	LITTLE KANAWHA		Sep-03	63.0	63.5			Х	63.3	MARGINAL
LITTLE MILL CREEK	OHIO (MIDDLE)		May-04	71.7	73.8	Х			72.8	SUB OPTIMAL
STEWARTS RUN	OHIO (MIDDLE)		Jul-04	73.3	62.9		Х		68.1	SUB OPTIMAL
UNT HUGHES RIVER	OHIO (MIDDLE)		Apr-03	76.7	67.2	Χ			72.0	SUB OPTIMAL
TOMLINSON RUN	OHIO (UPPER)		Mar-03	55.0	35.5			Х	45.3	POOR
TOTA	LS AND AVERAGE	S		69.4	62.9	4	1	2	66.1	

MARGINAL AND **POOR** SCORES ARE HIGHLIGHTED

Appalachian Clean Streams Program

The Office of Surface Mining's (OSM) Clean Streams Program is a broadbased program that works toward the elimination of acid mine drainage from abandoned coalmines. Using a combination of private and governmental resources, the program facilitates and coordinates citizen groups, university

researchers, the coal industry, corporations, the environmental community, and local, state, and federal government agencies that are involved in cleaning up streams polluted by acid drainage. Begun as an initiative in 1994, this successful program has funded 77 projects in ten states.

A major part of the Clean Streams Program is OSM's Watershed Internship Program. This program provides grants and training to organizations that support college students work on watersheds affected by acid mine drainage. It is a commitment to provide financial assistance that fosters development and implementation of watershed based planning. Internships are available for college students who are currently studying in the fields of environmental and civil engineering, biological studies or other environmental related fields and reclamation activities.

Internships are available in Ohio, West Virginia, Tennessee, Pennsylvania, Kentucky, Alabama, Maryland, Virginia, Indiana, Oklahoma, Illinois, Iowa, and Missouri. Table 11 lists the watersheds that received intern funding from the program in 2003-2004.

Table 11. WV Watershed groups with OSM interns

Friends of the Cheat
Guardians of the West Fork
Gilmer County Watershed Coalition
Plateau Action Network
Coal River Watershed Association
Friends of Deckers Creek
Lower West Fork Watershed Association
North Fork Watershed Project
Lower Greenbrier Watershed Association
Elkhorn Creek Watershed Association

Another part of the Appalachian Clean Streams Program is the Watershed Cooperative Agreement Project (WCAP) funds. These monies are available to award cooperative agreements to not-for-profit organizations, especially small watershed groups, that undertake local acid mine drainage (AMD) reclamation projects. The maximum award amount for each cooperative agreement are normally \$100,000, in order to assist as many groups as possible to undertake actual construction projects to clean streams impacted by acid mine drainage. Projects must meet eligibility criteria for coal projects outlined in the Surface Mining Law (Public Law 95-87).

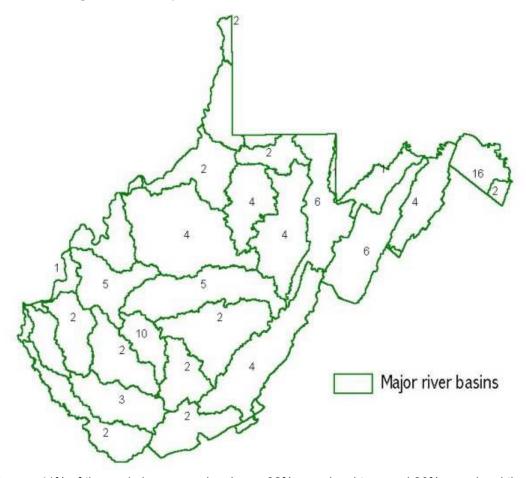
Read more about the Appalachian Clean Streams Program on the Office of Surface Mines web page at: http://www.osmre.gov/osm.htm.

WV SAVE OUR STREAMS WORKSHOPS

The primary goal of the WV Save Our Streams Program is to follow its mission to "promote the preservation and restoration of our state waters by providing a better understanding of their ecological integrity" through outreach and education. The stream monitoring workshops and various other kinds of related trainings offered by the program are the major ways this outreach is accomplished. We often measure whether we accomplish our goals and mission in terms of numbers. These numbers are used to compare our progress over time and to increase our productivity. Since 2000 the program has not set specific numeric criteria for workshops (these are taught as needed), however a minimum program goal is roughly a dozen each year scattered throughout the state.

In 2003-2004 the program coordinator and his certified designees taught 91 workshops and demonstrations resulting in a total of 204 certified volunteer monitors. An average of 12 persons attended each workshop with many more witnessing the demonstrations. Figure 20 shows the distribution of workshops by watershed.

Figure 20. Workshop distribution by watershed



Breakdown - 41% of the workshops were level one, 32% were level two, and 26% were level three. In addition, 3% were other types of training, which in 2003-2004 focused on the impacts and measurement of sedimentation.

THE FINAL ASSESSMENT

In this section we compare each basin's overall average score to a theoretical reference score that represents optimal conditions. The comparison is made using a simple percent difference statistic. Percent difference is applied when comparing two experimental quantities, neither of which can be considered the "correct" value. The comparison categories are as follows:

- **Riparian buffer and bank conditions**: This is an index based upon the conditions of the riparian buffer, stability of the banks and the vegetative cover on the banks.
- **Sedimentation**: This index is based upon the conditions of the channels sediment deposition (i.e. sand/gravel bars) impacts, embeddedness and riffle composition.
- **Habitat integrity**: This index is based upon the overall habitat conditions. A minimum of five habitat attributes is used.
- **Biological integrity**: This index is based upon the condition of the macroinvertebrate communities (i.e. stream index scores).

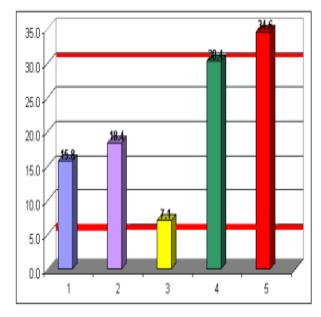
The table provides the average scores.

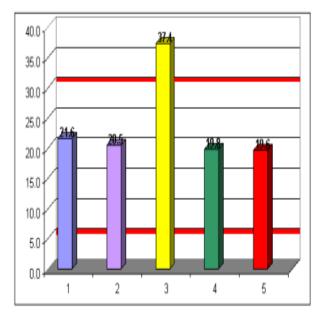
	SEDIMENTATION	BANK-BUFFER	HABITAT	BIOLOGICAL	AVERAGE	INTEGRITY RATING
POTOMAC	64.4	68.3	64.8	65.2	65.7	SUB-OPTIMAL
MONONGAHELA	65.1	66.5	61.9	63.9	64.4	MARGINAL
UPPER OHIO	54.8	74.5	65.3	64.0	64.7	MARGINAL
KANAWHA	65.6	58.9	60.7	58.5	60.9	MARGINAL
LOWER OHIO	65.7	56.4	59.5	68.0	62.4	MARGINAL
OVERALL AVERAGE	63.1	64.9	62.4	63.9	63.6	MARGINAL
		PERCEN	T DIFFERENCE			
1. POTOMAC	21.6	15.8	21.0	20.4	19.7	19.7

1. POTOMAC	21.6	15.8	21.0	20.4	19.7	19.7
2. MONONGAHELA	20.5	18.4	25.5	22.4	21.7	21.7
3. UPPER OHIO	37.4	7.1	20.2	22.2	21.2	21.6
4. KANAWHA	19.8	30.4	27.4	31.0	27.1	27.1
5. LOWER OHIO	19.6	34.6	29.4	16.2	24.7	24.9

REFERENCE SCORE = 80.0

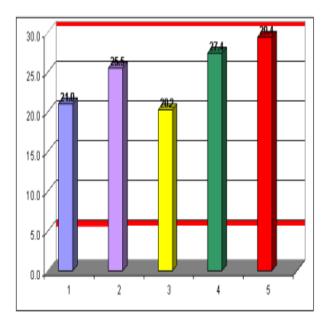
The bar graphs on the next page depict the results from the table. The red line at the 5 and 30 marks indicate the best and worst conditions. In other words, if a bar height is below the 5-mark, overall conditions would be given an optimal rating; if the height of is above the 30-mark, overall conditions would be given a poor rating. The 20-mark delineates between sub-optimal and marginal ranges.

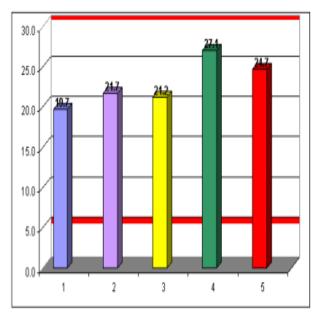




Buffer and bank

Sedimentation





Habitat integrity

Biological integrity

Most of the basins fall between the 5 and 30-mark, however, the Kanawha and the Upper Ohio exceeds the 30-mark in the buffer and bank category and the Upper Ohio exceeds the 30-mark in the sedimentation category.

It is important to keep in mind that these graphs are based upon a limited number of stations (less than 100 in most cases), especially the upper and lower Ohio basins.

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Appendix 1. Stream monitors and station locations

STREAM	STATION	DATE	LEVEL	MONITORS	COUNTY	BASIN		LATITUD			ONGITUD		TOPO
						_	DGREES	MINUTES	SECONDS	DEGREES	MINUTES	SECONDS	
BAKERS RUN	1		2	DOH	HARDY	CACAPON	39	2	27	78	44	45	NEEDMORE
BAKERS RUN	2		2	DOH	HARDY	CACAPON							NEEDMORE
BAKERS RUN	3		2	DOH	HARDY	CACAPON							BAKER
BAKERS RUN	4	May-04	1	EHMS	HARDY	CACAPON	39	2	51	78	45	27	BAKER
LONG LICK RUN			2	DOH	HARDY	CACAPON							NEEDMORE
LOST RIVER	1		2	DOH	HARDY	CACAPON	39	3	15	78	43	47	BAKER
LOST RIVER	2		2	DOH	HARDY	CACAPON	39	1	1	78	45	45	BAKER
SAUERKRAUT RUN	1		2	DOH	HARDY	CACAPON	39	6	28	78	39	37	BAKER
SAUERKRAUT RUN	2		2	DOH	HARDY	CACAPON							BAKER
TROUT RUN	1		2	DOH	HARDY	CACAPON	39	2	59	78	38	8	BAKER
TROUT RUN	2		2	DOH	HARDY	CACAPON							BAKER
WAITES RUN			2	DOH	HARDY	CACAPON							WARDENVILLE
BEAVER CREEK	3-1	Aug-03	2	FOC	PRESTON	CHEAT							CUZZART
BEAVER CREEK	3-2	Jul-03	2	FOC	PRESTON	CHEAT	39	36	34	79	33	36	CUZZART
BEAVER CREEK	3-3	Jul-03	2	FOC	PRESTON	CHEAT	39	36	41	79	31	04	CUZZART
BEAVER CREEK	3-4	Aug-03	2	FOC	PRESTON	CHEAT	39	37	36	79	35	38	CUZZART
BEAVER CREEK	3-5	Aug-03	2	FOC	PRESTON	CHEAT	39	35	4	79	37	2	CUZZART
BEAVER CREEK	3-6	Aug-03	2	FOC	PRESTON	CHEAT	39	35	4	79	37	4	BRANDONVILLE
BEAVER CREEK	3-7	Aug-03	2	FOC	PRESTON	CHEAT							BRANDONVILLE
BEAVER CREEK	3-1	May-04	2	FOC	PRESTON	CHEAT	39	37	37	79	35	58	BRANDONVILLE
BEAVER CREEK	3-5	May-04	2	FOC	PRESTON	CHEAT	39	36	34	79	33	36	CUZZART
BEAVER CREEK	3-10	May-04	2	FOC	PRESTON	CHEAT	39	37	20	79	35	23	CUZZART
BEAVER CREEK	3-9	May-04	2	FOC	PRESTON	CHEAT	39	37	36	79	35	38	CUZZART
BEAVER CREEK	3-8	May-04	2	FOC	PRESTON	CHEAT	39	37	20	79	35	23	CUZZART
BUFFALO RUN	1-2	Apr-04	2	FOC	PRESTON	CHEAT	39	27	4	79	39	2	KINGWOOD
BUFFALO RUN	1-1	Aug-03	2	FOC	PRESTON	CHEAT	39	27	30	79	39	20	KINGWOOD
BUFFALO RUN	1-2	Aug-03	2	FOC	PRESTON	CHEAT	39	27	25	79	39	1	KINGWOOD
BUFFALO RUN	1-3	Aug-03	2	FOC	PRESTON	CHEAT	39	26	50	79	39	29	KINGWOOD
BUFFALO RUN	1-4	Aug-03	2	FOC	PRESTON	CHEAT	39	26	25	79	39	3	KINGWOOD
BUFFALO RUN	1-5	Aug-03	2	FOC	PRESTON	CHEAT	39	26	15	79	39	11	KINGWOOD
BUFFALO RUN	1-6	Aug-03	2	FOC	PRESTON	CHEAT	39	26	15	79	39	11	KINGWOOD
BUFFALO RUN	1-7	Jul-03	2	FOC	PRESTON	CHEAT	39	25	55	79	35	21	KINGWOOD
BUFFALO RUN		Oct-04	1	PCHS	PRESTON	CHEAT	39	26	7	79	31	3	KINGWOOD
BUFFALO RUN	1-1	May-04	2	FOC	PRESTON	CHEAT	39	27	30	79	39	20	KINGWOOD
BUFFALO RUN		May-04		FOC	PRESTON	CHEAT							KINGWOOD
BUFFALO RUN		May-04		FOC	PRESTON	CHEAT							KINGWOOD
BUFFALO RUN		May-04		FOC	PRESTON	CHEAT	39	26	15	79	39	11	KINGWOOD
BUFFALO RUN		May-04		FOC	PRESTON	CHEAT	39	25	55	79	39	21	KINGWOOD
GLADY FORK		Aug-04		TU	RANDOLPH	CHEAT	38	57	9	79	36	4	GLADY
GLADE RUN	4-1	Jul-03	2	FOC	PRESTON	CHEAT	39	35	57	79	36	4	CUZZART
GLADE RUN	4-2	Jul-03	2	FOC	PRESTON	CHEAT	39	35	39	79	36	8	CUZZART

STREAM	STATION	DATE	I FVFI	MONITORS	COUNTY	BASIN		LATITUDI	E	L	ONGITUD	E	TOPO
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GLADE RUN	4-3	Jul-03	2	FOC	PRESTON	CHEAT	39	35	57	79	36	8	CUZZART
GLADE RUN	4-2	May-04	2	FOC	PRESTON	CHEAT	39	35	37	79	36	9	CUZZART
GLADE RUN	4-3	May-04	2	FOC	PRESTON	CHEAT							CUZZART
GLADE RUN	4-4	May-04	2	FOC	PRESTON	CHEAT	39	35	59	79	36	8	CUZZART
MUDDY CREEK	1	Jun-03	2	AURELEM	PRESTON	CHEAT							VALLEY POINT
MUDDY CREEK	1	Jul-03	2	FOC	PRESTON	CHEAT	39	33	7	79	37	3	VALLEY POINT
NF GREENS RUN	2-1	Jul-03	2	FOC	PRESTON	CHEAT	39	29	5	79	4	27	KINGWOOD
NF GREENS RUN	2-2	Jul-03	2	FOC	PRESTON	CHEAT	39	30	17	79	40	4	KINGWOOD
NF GREENS RUN	2-3	Jul-03	2	FOC	PRESTON	CHEAT	39	30	35	79	42	13	VALLEY POINT
NF GREENS RUN	2-4	Jul-03	2	FOC	PRESTON	CHEAT	39	29	37	79	40	9	VALLEY POINT
NF GREENS RUN	2-1	May-04	2	FOC	PRESTON	CHEAT	39	37	20	79	35	23	KINGWOOD
NF GREENS RUN	2-2	May-04	2	FOC	PRESTON	CHEAT	39	29	39	79	40	17	KINGWOOD
NF GREENS RUN	2-4	May-04	2	FOC	PRESTON	CHEAT	39	29	39	79	40	17	VALLEY POINT
ROARING CREEK	1	Jun-03	2	FOC	PRESTON	CHEAT	39	30	3	79	38	6	VALLEY POINT
ROARING CREEK	2	Jul-03	2	FOC	PRESTON	CHEAT	39	31	50	79	35	7	CUZZART
WATKINS RUN	1	May-03	2	FLM	PRESTON	CHEAT	39	20	1	79	43	3	ROWLESBURG
WATKINS RUN	2	Aug-03	2	FLM	PRESTON	CHEAT	39	20	3	79	43	14	ROWLESBURG
WATKINS RUN	2	Aug-04	2	FLM	PRESTON	CHEAT	39	20	03	79	43	14	FELLOWSVILLE
CLEAR FORK		Apr-04	1	CFWA	RALEIGH	COAL	37	57	2	81	26	6	DOROTHY
BIG SPRING FORK	1	Jul-04	3	TH-EHWA	POCAHONTAS	ELK	38	25	1	80	7	8	SHARP KNOB
CAMP CREEK	1	Jun-04	3	TU	BRAXTON	ELK	38	36		80	37		ERBACON
OLD FIELD FORK	1	Apr-04	3	TU-EHWA	POCAHONTAS	ELK	38	25	49	80	7	8	SHARP KNOB
ELK RIVER	1	Oct-03	3	TU-EHWA	RANDOLPH	ELK	38	32	3	80	9	4	SAMP
ELK RIVER	1	Oct-04	3	TU-EHWA	RANDOLPH	ELK	38	32	3	80	9	4	MINGO
ELK RIVER	2	Aug-04	1	BREATH	CLAY	ELK	38	29	57	81	4	32	CLAY
ELKLICK RUN		Oct-04	2	GPAC	NICHOLAS	GAULEY	38	10	32	80	27	49	FORK MOUNTAIN
RICH CREEK		Mar-03	1	TU	FAYETTE	GAULEY	38	11	9	81	6	1	ANSTED
UPPER GLADE RUN	1	Apr-04	3	SHDSPRHS	WEBSTER	GAULEY	38	24	1	80	29	13	WEBSTER SPRINGS
UPPER GLADE RUN	2	Jun-04	2	CAMP	WEBSTER	GAULEY	38	24	12	80	29	15	WEBSTER SPRINGS
UPPER GLADE RUN	3	Jun-03	2	CAMP	WEBSTER	GAULEY							WEBSTER SPRINGS
HARTS RUN		Feb-04	2	LGWA	GREENBRIER	GREENBRIER	37	45	2	80	21	2.6	WHITE SULPHUR SPRINGS
GREENBRIER RIVER		Jul-04	1	ICWA	SUMMERS	GREENBRIER	37	43	26	80	31	39	ALDERSON
SECOND CREEK	1	Jul-04	1	ICWA	MONROE	GREENBRIER	37	42	26	80	31	42	RONCEVERTE
SECOND CREEK	2	Jul-03	1	ICWA	MONROE	GREENBRIER	37	38	14	80	26	30	FORT SPRING
BARKERS CREEK		May-03	2	UGWA	WYOMING	GUYANDOTTE	37	32	36	81	23	21	MULLENS
CABIN CREEK		Jul-03	1	UGWA	WYOMING	GUYANDOTTE	37	36	17	81	26	51	MULLENS
DEVILS FORK		Jul-03	1	UGWA	WYOMING	GUYANDOTTE	37	35	26	81	18	38	MULLENS
GUYANDOTTE RIVER		Sep-03	2	RWTC	LOGAN	GUYANDOTTE	37	49	20	81	57	43	LOGAN
SLAB FORK	1	Jul-03	1	UGWA	WYOMING	GUYANDOTTE	37	35	26	81	22	35	MULLENS
SLAB FORK	1	Oct-04	1	UGWA	WYOMING	GUYANDOTTE							MULLENS
ASH BRANCH		Apr-03	2	TU	KANAWHA	KANAWHA	38	06	1	81	22	5	ESKDALE
FIVEMILE FORK	1	Jul-03	2	KCCA	KANAWHA	KANAWHA	38	15	26	81	21	3.6	MAMMOTH

STREAM	STATION	DATE	I EVEI	MONITORS	COUNTY	BASIN		LATITUDE		L	ONGITUD	E	TOPO
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FIVEMILE FORK	2	Jul-03	2	KCCA	KANAWHA	KANAWHA	38	15	1.2	81	22	4.1	MAMMOTH
FROZEN BRANCH		Jul-03	2	KCCA	KANAWHA	KANAWHA	38	13	4	81	25	1	CEDAR GROVE
GOOSE HOLLOW	1	Jul-03	2	KCCA	KANAWHA	KANAWHA	38	15	6	81	21	2	MAMMOTH
GOOSE HOLLOW	2	Jun-03	2	KCCA	KANAWHA	KANAWHA	38	16	2	81	20	5	MAMMOTH
HICKS HOLLOW		Jun-03	2	KCCA	KANAWHA	KANAWHA	38	14	7	81	25	1	CEDAR GROVE
HORSEMILL BRANCH		Jul-03	2	KCCA	KANAWHA	KANAWHA	38	13	2	81	25	4	CEDAR GROVE
HURRICANE FORK		Jun-03	2	KCCA	KANAWHA	KANAWHA	38	16	3	81	19	3	MAMMOTH
KELLYS CREEK	1	Jul-03	2	KCCA	KANAWHA	KANAWHA	38	13	0	81	25	4	MAMMOTH
KELLYS CREEK	2	Jul-03	2	KCCA	KANAWHA	KANAWHA							CEDAR GROVE
KELLYS CREEK	3	Jul-03	2	KCCA	KANAWHA	KANAWHA	38	17	1	81	21	3	CEDAR GROVE
KELLYS CREEK	4	Jun-03	2	KCCA	KANAWHA	KANAWHA	38	14	3	81	24	3	CEDAR GROVE
KELLYS CREEK		Jun-03	2	KCCA	KANAWHA	KANAWHA	38	15	6	81	22	44	QUICK
MORRIS CREEK		Sep-04	1	MCWA	KANAWHA	KANAWHA	38	8	29	81	20	52	MONTGOMERY
MORRIS CREEK	15	Nov-04	3	MCWA	FAYETTE	KANAWHA	38	8	0	81	21	6	MONTGOMERY
MORRIS CREEK	7	Nov-04	3	MCWA	KANAWHA	KANAWHA	39	9	7	81	20	0	MONTGOMERY
MANILA CREEK	7	Jul-03	2	HMWO	PUTNAM	KANAWHA							BANCROFT
MANILA CREEK	6	Apr-03	2	HMWO	PUTNAM	KANAWHA							BANCROFT
MANILA CREEK	5	Apr-03	2	HMWO	PUTNAM	KANAWHA	38	32	27	81	48	13	BANCROFT
MANILA CREEK	4	Jul-03	2	HMWO	PUTNAM	KANAWHA							BANCROFT
MANILA CREEK	3	Jul-03	2	HMWO	PUTNAM	KANAWHA	38	31	2	81	48	31	BANCROFT
MANILA CREEK	2	Jul-03	2	HMWO	PUTNAM	KANAWHA							BANCROFT
MANILA CREEK	1	Jul-03	2	HMWO	PUTNAM	KANAWHA	38	29	39	81	47	60	BANCROFT
MANILA CREEK	7	Apr-03	2	HMWO	PUTNAM	KANAWHA	38	33	32	81	47	16	BANCROFT
MANILA CREEK		Oct-03	2	HMWO	PUTNAM	KANAWHA	38	32	80	81	48	0	BANCROFT
POCATALICO RIVER		May-03	1	PTHELEM	KANAWHA	KANAWHA	38	31	11	81	39	43	SISSONVILLE
TRACE FORK		Aug-03	1	DCWA	KANAWHA	KANAWHA	38	19	56	81	42	50	CHARLESTON WEST
UNT LEFT FORK		Jul-03	2	KCCA	KANAWHA	KANAWHA	38	16	4	81	21	5.2	MAMMOTH
WILLIS BRANCH		Jul-03	2	UPCWA	FAYETTE	KANAWHA	37	54	43	81	16	32	PAX
CEDAR CREEK		Sep-03	2	GSC	GILMER	LITTLE KANAWHA	38	52	39	80	50	28	GLENVILLE
CEDAR CREEK		Apr-03	2	GSC	GILMER	LITTLE KANAWHA							GLENVILLE
ELLIS CREEK		Sep-03	3	GCWC	GILMER	LITTLE KANAWHA	38	58	4	80	43	2	GILMER
LITTLE KANAWHA RIVER		Aug-03	2	CGTC	CALHOUN	LITTLE KANAWHA							GRANTSVILLE
ABRAMS CREEK			2	DOH	GRANT	NORTH BRANCH	39	18	22	79	11	33	GREENLAND GAP
ELKLICK RUN			2	DOH	GRANT	NORTH BRANCH							GREENLAND GAP
NF PATTERSON CREEK	1		2	DOH	GRANT	NORTH BRANCH	39	11	29	79	3	47	MEDLEY
NF PATTERSON CREEK	2		2	DOH	GRANT	NORTH BRANCH	39	10	32	79	7	1	MEDLEY
PATTERSON CREEK			2	DOH	GRANT	NORTH BRANCH	39	14	13	79	1	8	MEDLEY
BRUSH CREEK	2	Oct-04	1	PKVHS	MERCER	NEW	37	26	1	81	3	7	ATHENS
BRUSH CREEK	1	Apr-05	3	WVGC	MERCER	NEW	37	27	35	81	03	34	ATHENS
DROOPING LICK CREEK		May-04	1	ICWA	MONROE	NEW	37	29	54	80	36	4	UNION
HANS CREEK		Oct-03	1	ICWA	MONROE	NEW	37	3	14	80	43	38	LINDSIDE
INDIAN CREEK		Sep-03	1	ICWA	MONROE	NEW	37	33	17	80	34	35	UNION

STREAM	STATION	DATE	LEVEL	MONITORS	COUNTY	BASIN		LATITUDI	E	L	ONGITUD	E	ТОРО
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LAUREL CREEK		Oct-03	2	OHCC	FAYETTE	NEW	38	04	5	81	8	5	BECKWITH
WOLF CREEK		May-03	2	OHCC	FAYETTE	NEW	38	3	36	81	4	24	FAYETTEVILLE
LITTLE MILL CREEK		May-04	2	RJTCS	ROAN	MIDDLE OHIO	38	49	18	81	33	50	GAY
STEWARTS RUN		Jul-04	1	BREATH	RITCHIE	MIDDLE OHIO							HARRISVILLE
UNT HUGHES RIVER		Apr-03	1	TU	DODRIDGE	MIDDLE OHIO	39	12	10	81	6	1	HARRISVILLE
TOMLINSON RUN		Mar-03	2	NCUMHS	HANCOCK	UPPER OHIO	40	32	50	80	35	40	EAST LIVERPOOL SOUTH
BACK CREEK	3	Jul-04	1	BHEN	HANCOCK	POTOMAC DIRECT	39	23	49	78	8	54	TABLERS STATION
ELK BRANCH		Oct-03	2	JCWC	JEFFERSON	POTOMAC DIRECT	39	20	32	77	46	42	CHARLES TOWN
ELK RUN	1	May-03	2	JCWC	JEFFERSON	POTOMAC DIRECT	39	20	10	77	46	7	CHARLES TOWN
ELK RUN	2	Oct-03	2	JCWC	JEFFERSON	POTOMAC DIRECT	39	20	10	77	46	7	CHARLES TOWN
ELK RUN	1	Oct-03	2	JCWC	JEFFERSON	POTOMAC DIRECT	39	20	07	77	45	45	CHARLES TOWN
HARPER RUN		Jul-03	3	BHEN/FOCA	BERKELEY	POTOMAC DIRECT	39	33	6	78	1	15	BIG POOL
HALF MILE RUN		Mar-04	2	BHEN	BERKELEY	POTOMAC DIRECT	39	31	38	78	2	40	BIG POOL
KATES RUN		Jun-04	3	BHEN	BERKELEY	POTOMAC DIRECT	39	34	6	78	0	25	BIG POOL
OPEQUON CREEK	2	Jul-04	1	IWLA	BERKELEY	POTOMAC DIRECT							MIDDLEWAY
OPEQUON CREEK	1	Oct-03	1	IWLA	BERKELEY	POTOMAC DIRECT	39	31	0	77	53	4	HEDGESVILLE
RATTLESNAKE RUN	3	Sep-03	2	JCWC	JEFFERSON	POTOMAC DIRECT	39	35	5	77	45	34	SHEPHERDSTOWN
RATTLESNAKE RUN	2	Sep-03	2	JCWC	JEFFERSON	POTOMAC DIRECT	39	23	42	77	47	57	SHEPHERDSTOWN
RATTLESNAKE RUN	1	Apr-03	2	JCWC	JEFFERSON	POTOMAC DIRECT	39	25	5	77	45	34	SHEPHERDSTOWN
RATTLESNAKE RUN	3	Apr-03	2	JCWC	JEFFERSON	POTOMAC DIRECT	39	23	42	77	47	57	SHEPHERDSTOWN
RATTLESNAKE RUN	1	Apr-03	2	JCWC	JEFFERSON	POTOMAC DIRECT							SHEPHERDSTOWN
ROCKY MARSH RUN	1	Oct-03	2	JCWC	JEFFERSON	POTOMAC DIRECT	39	25	51	77	51	46	SHEPHERDSTOWN
ROCKY MARSH RUN	2	Apr-03	2	JCWC	JEFFERSON	POTOMAC DIRECT	39	29	20	77	39	39	SHEPHERDSTOWN
SLEEPY CREEK	1	May-04	1	SCWA	MORGAN	POTOMAC DIRECT	39	36	18	78	9	58	STOTLERS CROSSROADS
SLEEPY CREEK	2	Jun-04	1	SCWA	MORGAN	POTOMAC DIRECT	39	38	25	78	7	15	STOTLERS CROSSROADS
SLEEPY CREEK	3	Jul-04	1	SCWA	MORGAN	POTOMAC DIRECT							HANCOCK
SLEEPY CREEK	3	Nov-03	2	SCWA	MORGAN	POTOMAC DIRECT	39	28	28	78	16	24	HANCOCK
SLEEPY CREEK	2	Aug-03	2	SCWA	MORGAN	POTOMAC DIRECT							STOTLERS CROSSROADS
SLEEPY CREEK	1	Jul-03	1	SCWA	MORGAN	POTOMAC DIRECT	39	37	22	78	05	58	STOTLERS CROSSROADS
SLEEPY CREEK		Sep-04	1	SCWA	MORGAN	POTOMAC DIRECT							STOTLERS CROSSROADS
TOWN RUN		Oct-03	2	JCWC	JEFFERSON	POTOMAC DIRECT	39	25	15	77	49	14	SHEPHERDSTOWN
TUSCARORA CREEK	1	Jul-04	1	CA-BHEN	BERKELEY	POTOMAC DIRECT	39	28	6	77	59	53	MARTINSBURG
TUSCARORA CREEK	2	Apr-04	2	EAGELEM	BERKELEY	POTOMAC DIRECT	39	27	58	77	58	4	MARTINSBURG
ANDERSON RUN			2	DOH	HARDY	SOUTH BRANCH	39	8	9	78	56	10	OLD FIELD
BIG RUN	1	Jun-04	1	TMI	PENDLETON	SOUTH BRANCH							SPRUCE KNOB
BIG RUN	2	Aug-04	3	TMI	PENDLETON	SOUTH BRANCH	38	41	4	79	34	20	SPRUCE KNOB
BIG RUN		Apr-04		TMI	PENDLETON	SOUTH BRANCH	38	40	34	79	34	30	SPRUCE KNOB
CLIFFORD HOLLOW			2	DOH	HARDY	SOUTH BRANCH							MOOREFIELD
DUMPLING RUN			2	DOH	HARDY	SOUTH BRANCH	39	4	38	78	57	27	MOOREFIELD
FORT RUN			2	DOH	HARDY	SOUTH BRANCH	39	5	24	78	57	10	MOOREFIELD
NORTH FORK		Oct-04	1	PMS	PENDLETON	SOUTH BRANCH	38	23	26	79	36	30	ONEGO
SOUTH BRANCH		Oct-04	1	PMS	PENDLETON	SOUTH BRANCH	38	60	23	79	35	38	SUGAR GROVE

STREAM	STATION	DATE	I FVFI	MONITORS	COUNTY	BASIN		LATITUDE		L	ONGITUD	E	TOPO
OTT CENT	017111011	, D, (; L		WOTH TOTAL	000111	2710111	DGREES	MINUTES	SECONDS	DEGREES	MINUTES	SECONDS	10.0
SOUTH BRANCH		Oct-04	1	PMS	PENDLETON	SOUTH BRANCH	38	20	18	79	27	57	UPPER TRACT
SOUTH BRANCH		Oct-04	1	PMS	PENDLETON	SOUTH BRANCH	38	06	10	79	32	37	FRANKLIN
SOUTH MILL CREEK		Jul-03	3	PHS	GRANT	SOUTH BRANCH	38	57	40	79	6	45	PERTESBURG EAST
SPRING RUN	1	Jul-03	2	FSRWT	GRANT	SOUTH BRANCH	38	55	9	79	5	10	PERTESBURG EAST
SPRING RUN	2	Jul-03	2	FSRWT	GRANT	SOUTH BRANCH	38	55	7	79	5	9	PERTESBURG EAST
SPRING RUN	3	Jul-03	2	FSRWT	GRANT	SOUTH BRANCH	38	55	5	79	5	5	PERTESBURG EAST
SPRING RUN	4	Jul-03	2	FSRWT	GR	SOUTH BRANCH	38	55	0	79	4	9	PERTESBURG EAST
SOUTH FORK		Oct-04	1	PMS	PENDLETON	SOUTH BRANCH	38	07	37	79	20	28	FORT SEYBERT
TOMBS HOLLOW RUN			2	DOH	HARDY	SOUTH BRANCH							MEDLEY
WALNUT BOTTOM	1		2	DOH	HARDY	SOUTH BRANCH	39	8	7	78	58	38	OLD FIELD
WALNUT BOTTOM	2		2	DOH	HARDY	SOUTH BRANCH							OLD FIELD
BULLSKIN RUN	1	Nov-03	2	JCWC	JEFFERSON	SHENANDOAH	39	12	43	77	50	5	CHARLES TOWN
BULLSKIN RUN	2	Oct-03	2	JCWC	JEFFERSON	SHENANDOAH	39	14	4	77	53	49	CHARLES TOWN
BULLSKIN RUN	3	Nov-03	2	JCWC	JEFFERSON	SHENANDOAH	39	14	56	77	56	1	CHARLES TOWN
EVITTS RUN	1	May-03	2	JCWC	JEFFERSON	SHENANDOAH	39	17	30	77	52	9	CHARLES TOWN
EVITTS RUN	1	Oct-03	2	JCWC	JEFFERSON	SHENANDOAH	39	17	30	77	52	9	CHARLES TOWN
EVITTS RUN	2	Oct-03	2	JCWC	JEFFERSON	SHENANDOAH	39	15	09	77	51	17	CHARLES TOWN
EVITTS RUN	3	Oct-03	2	JCWC	JEFFERSON	SHENANDOAH							CHARLES TOWN
EVITTS RUN	4	Apr-03	2	JCWC	JEFFERSON	SHENANDOAH	39	17	50	77	54	22	CHARLES TOWN
EVITTS RUN	4	Oct-03	2	JCWC	JEFFERSON	SHENANDOAH	39	17	50	77	54	22	CHARLES TOWN
HUBBARDS RUN	1	Nov-03	2	JCWC	JEFFERSON	SHENANDOAH							CHARLES TOWN
HUBBARDS RUN	2	Apr-03	2	JCWC	JEFFERSON	SHENANDOAH							CHARLES TOWN
BRADSHAW CREEK	2	Mar-03	1	ECWA	MCDOWELL	TUG FORK	37	18	60	81	49	11	BRADSHAW
BRADSHAW CREEK	1	Mar-03	1	ECWA	MCDOWELL	TUG FORK	37	20	51	81	48	16	BRADSHAW
DRY FORK		Apr-03	1	ECWA	MCDOWELL	TUG FORK	37	20	55	81	47	48	BRADSHAW
ELKHORN CREEK		Mar-03	1	ECWA	MCDOWELL	TUG FORK	37	24	41	81	27	21	KEYSTONE
TWIN BRANCH		Oct-03	1	ECWA	MCDOWELL	TUG FORK	37	29	8	81	39	44	DAVY
LEADING CREEK			2	DOH	RANDOLPH	TYGART VALLEY							MONTROSE
LF FILES CREEK		Jun-04	2	NPS-WVCA	RANDOLPH	TYGART VALLEY	38	49	41	79	47	53	BEVERLY EAST
LF FILES CREEK		May-04	1	ELMS	RANDOLPH	TYGART VALLEY	38	49	41	79	47	53	BEVERLY EAST
LF FILES CREEK		May-03	1	ELMS	RANDOLPH	TYGART VALLEY							BEVERLY EAST
LB/LF SANDY CREEJ	1	Jun-04	2	FLM	PRESTON	TYGART VALLEY	39	18	6	79	47	52	FELLOWSVILLE
LB/LF SANDY CREEJ	1	Jul-03	2	FLM	PRESTON	TYGART VALLEY	39	18	6	79	47	52	FELLOWSVILLE
LB/LF SANDY CREEJ	2	Aug-04	2	FLM	PRESTON	TYGART VALLEY	39	18	06	79	47	53	FELLOWSVILLE
LF SANDY CREEK		Jul-03	2	FLM	PRESTON	TYGART VALLEY	39	18	0	79	47	60	FELLOWSVILLE
LF SANDY CREEK		May-03	2	FLM	PRESTON	TYGART VALLEY	39	18	0	79	41	6	FELLOWSVILLE
MILLSTONE CREEK		May-04	1	ELMS	RANDOLPH	TYGART VALLEY	38	50	6	79	47	50	BEVERLY EAST
MILLSTONE CREEK		May-03	1	ELMS	RANDOLPH	TYGART VALLEY							BEVERLY EAST
RB/LF SANDY CREEK	2	Jun-04	2	FLM	PRESTON	TYGART VALLEY	39	18	3	79	47	43	FELLOWSVILLE
RB/LF SANDY CREEK	2	May-03	2	FLM	PRESTON	TYGART VALLEY	39	18	0	79	47	5	FELLOWSVILLE
RB/LF SANDY CREEK	2	Jul-03	2	FLM	PRESTON	TYGART VALLEY	39	18	3	79	47	43	FELLOWSVILLE
RB/LF SANDY CREEK	1	Aug-04	2	FLM	PRESTON	TYGART VALLEY	39	18	03	79	44	43	FELLOWSVILLE

STREAM	STATION	DATE	I FVFI	MONITORS	COUNTY	BASIN		LATITUD	E	L	ONGITUDI	E	TOPO
011(E) (W)	017111011	D, (12		Worth orto	0001111	2710111	DGREES	MINUTES	SECONDS	DEGREES	MINUTES	SECONDS	1010
UNT MIDDLE FORK RIVER		Jul-04	3	CAMP	LEWIS	TYGART VALLEY	38	57	2	80	4	5	CASSITY
BOOTH CREEK		Jul-03	2	LWFWA	MARION	WEST FORK	39	26	10	80	12	5	FAIRMONT WEST
BRUSHY FORK		Jul-03	3	GUARD	HARRISON	WEST FORK	39	13	54	80	17	19	MOUNT CLARE
ELK CREEK		Mar-04	2	ABC	BARBOUR	WEST FORK	39	8	1	80	6	12	PHILLIPI
HELENS RUN		Aug-04	1	LWFWA	MARION	WEST FORK	39	27	7	80	15	2	SHINSTON
ISAACS CREEK		Jul-03	3	GUARD	HARRISON	WEST FORK	39	21	21	80	24	41	WOLF SUMMIT
KINCHELOE CREEK		Jul-03	3	GUARD	HARRISON	WEST FORK	39	81	57	80	30	31	WEST MILFORD
LAMBERTS RUN		Jun-03	3	GUARD	HARRISON	WEST FORK	39	20	35	80	20	60	CLARKSBURG
SALEM FORK		May-03	3	GUARD	HARRISON	WEST FORK	39	17	51	80	33	53	SALEM
SKIN CREEK		Apr-03	2	ENV	LEWIS	WEST FORK	38	55	10	80	23	8	ROANOKE
TENMILE CREEK		Sep-03	3	GUARD	HARRISON	WEST FORK	39	19	20	80	23	07	WOLF SUMMIT
TWO LICK CREEK		Jul-03	3	GUARD	HARRISON	WEST FORK	39	10	7	80	28	52	WEST MILFORD
UNT LAMBERTS RUN		May-03	3	GUARD	HARRISON	WEST FORK	39	20	19	80	22	22	CLARKSBURG
RHINE CREEK		Apr-03	2	AURELEM	PRESTON	YOUGHIOGHENY							AURORA

Appendix 2. Water chemistry

STREAM	BASIN	STATION	DATE			,				WATER	CHEMISTRY	1			
J	27.0	0.7	27112	PH	COND	DO	IRON	AL	MN	PHOSPHATE	NITRATE	ACID	FECAL	HARDNESS	ALKALINE
BAKERS RUN	CACAPON	1		7.5											
BAKERS RUN	CACAPON	2		7.5		8.5									
BAKERS RUN	CACAPON	3		7.5		9.6									
LONG LICK RUN	CACAPON			7.7		8.5									
LOST RIVER	CACAPON	1		7.5		7.6									
LOST RIVER	CACAPON	2		7.5							2.0				
SAUERKRAUT RUN	CACAPON	1		7.8		9.2									
SAUERKRAUT RUN	CACAPON	2		7.8		10.2									
TROUT RUN	CACAPON	1		7.6		10.5									
TROUT RUN	CACAPON	2		7.6		10.5									
WAITES RUN	CHEAT			7.3		10.0									
BEAVER CREEK	CHEAT	3-1	Aug-03	7.8	181	8.0	1.2	0.1	0.4						
BEAVER CREEK	CHEAT	3-2	Jul-03	7.1	36	10.0	0.5	0.5	0.1						
BEAVER CREEK	CHEAT	3-3	Jul-03	5.1	25	9.0	0.4	0.4	0.1						
BEAVER CREEK	CHEAT	3-4	Aug-03	7.3	164	8.0	0.4	0.4	0.5						
BEAVER CREEK	CHEAT	3-5	Aug-03	4.0	376	8.0	0.6	4.0	2.7						
BEAVER CREEK	CHEAT	3-6	Aug-03		98	11.0	0.4	0.5	0.5						
BEAVER CREEK	CHEAT	3-7	Aug-03		164	8.0	0.3	0.3	0.3						
BEAVER CREEK	CHEAT	3-1	May-04		136		0.3	0.3	0.3			8.0			340.0
BEAVER CREEK	CHEAT	3-5	May-04	6.9	43	10.0	0.6	0.6	0.1			7.0			3.0
BEAVER CREEK	CHEAT	3-10	May-04		81		0.6		0.2			2.0			5.0
BEAVER CREEK	CHEAT	3-9	May-04		100		0.3		0.4						
BEAVER CREEK	CHEAT	3-8	May-04		296		0.7	2.4	2.0			20.0			1.0
BUFFALO RUN	CHEAT	1-2	Apr-04		223										
BUFFALO RUN	CHEAT	1-1	Aug-03		279	8.0	0.5	0.2	0.8						
BUFFALO RUN	CHEAT	1-2	Aug-03		108	66.0	0.2		0.0						
BUFFALO RUN	CHEAT	1-3	Aug-03		359	8.0	0.1		1.0						
BUFFALO RUN	CHEAT	1-4	Aug-03		398		0.5		3.4						
BUFFALO RUN	CHEAT	1-5	Aug-03		381		0.1		0.2						
BUFFALO RUN	CHEAT	1-6	Aug-03		314	9.0	0.2		0.0						
BUFFALO RUN	CHEAT	1-7		8.0		9.0	0.1		1.2						
BUFFALO RUN	CHEAT		Oct-04		468	8.0									
BUFFALO RUN	CHEAT	1-1	May-04		110	9.4	0.4	0.3	0.3			1.0			12.0
BUFFALO RUN	CHEAT	1-3	May-04		101	9.4	-								
BUFFALO RUN	CHEAT	1-5	May-04			9.2	0.8	0.4	0.5			1.0			6.0
BUFFALO RUN	CHEAT	1-6	May-04	+		9.4	1.1		0.2			1.0			31.0
GLADY FORK	CHEAT		Aug-04			9.6		0.0	J						00
GLADE RUN	CHEAT	4-1		8.0		8.0			<u> </u>						
GLADE RUN	CHEAT	4-2		7.6		10.0									
GLADE RUN	CHEAT	4-3		6.4	219	7.0									
GLADE RUN	CHEAT	4-2	May-04			8.0									

STREAM	BASIN	STATION	DATE							WATER	CHEMISTRY	,			
STILLAIM	DASIN	STATION	DAIL	РН	COND	DO	IRON	AL	MN	PHOSPHATE	NITRATE	ACID	FECAL	HARDNESS	ALKALINE
GLADE RUN	CHEAT	4-3	May-04	6.4	142	8.0									
GLADE RUN	CHEAT	4-4	May-04	6.8	168	8.0									
MUDDY CREEK	CHEAT	1	Jun-03	7.3	290										
MUDDY CREEK	CHEAT	1	Jul-03	8.0	310	12.0									
NORTH FK GREENS RUN	CHEAT	2-1	Jul-03	7.6			0.2	1.0	0.4						
NORTH FK GREENS RUN	CHEAT	2-2	Jul-03	4.6	90		0.5	2.4	0.7						
NORTH FK GREENS RUN	CHEAT	2-3	Jul-03	4.3	100		0.3	2.3	8.0						
NORTH FK GREENS RUN	CHEAT	2-4	Jul-03	6.4	50		0.2	0.2	0.1						
NORTH FK GREENS RUN	CHEAT	2-1	May-04	7.4	145	8.0	1.3	1.8	0.4						
NORTH FK GREENS RUN	CHEAT	2-2	May-04	6.5	104	9.0	3.3	3.0	0.5			10.0			1.0
NORTH FK GREENS RUN	CHEAT	2-4	May-04	6.4	64	10.0	0.0	0.0	0.0			0.0			6.2
ROARING CREEK	CHEAT	1	Jun-03	7.0	150										
ROARING CREEK	CHEAT	2	Jul-03	7.6	140										
WATKINS RUN	CHEAT	1	May-03	8.4	48	12.2									
CLEAR FORK	COAL		Apr-04	8.1	300										
BIG SPRING FORK	ELK	1	Jul-04	8.0	240	11.5									
CAMP CREEK	ELK	1	Jun-04	7.5	278	11.6									
OLD FIELD FORK	ELK	1	Apr-04	8.4	70	10.1									
ELK RIVER	ELK	1	Oct-03	7.7	110	10.2									
ELK RIVER	ELK	1	Oct-04	8.1	132	11.5									
ELK RIVER	ELK	2	Aug-04	7.7	240	8.6									
ELKLICK RUN	GAULEY		Oct-04	6.5	30										
UPPER GLADE RUN	GAULEY	1	Apr-04	7.8	193	9.7									
UPPER GLADE RUN	GAULEY	2	Jun-04	7.1	40										
UPPER GLADE RUN	GAULEY	3	Jun-03	8.2	48	10.0									
HARTS RUN	GREENBRIER		Feb-04	9.1	50										20.0
BARKERS CREEK	GUYANDOTTE		May-03	7.8											
SLAB FORK	GUYANDOTTE	1	Oct-04	8.4	247										
MANILA CREEK	KANAWHA	2	Jul-03	4.5			16.0								
MANILA CREEK	KANAWHA		Oct-03	7.9	260										
POCATALICO RIVER	KANAWHA		May-03	8.1	301	7.5									
ASH BRANCH	KANAWHA		Apr-03	7.8	420										
FIVEMILE FORK	KANAWHA	1	Jul-03	8.0	550										
FIVEMILE FORK	KANAWHA	2	Jul-03	8.2	620										
FROZEN BRANCH	KANAWHA		Jul-03	8.0	220										
GOOSE HOLLOW	KANAWHA	1	Jul-03												
GOOSE HOLLOW	KANAWHA	2	Jun-03												
HICKS HOLLOW	KANAWHA		Jun-03												
HORSEMILL BRANCH	KANAWHA		Jul-03												
HURRICANE FORK	KANAWHA		Jun-03	8.3	890										
KELLYS CREEK	KANAWHA	2	Jul-03		590										
KELLYS CREEK	KANAWHA	3	Jul-03	6.9	400										

STREAM	BASIN	STATION	DATE							WATER	CHEMISTRY	,			
STREAM	DAGIN	STATION	DAIL	РН	COND	DO	IRON	AL	MN	PHOSPHATE	NITRATE	ACID	FECAL	HARDNESS	ALKALINE
KELLYS CREEK	KANAWHA		Jun-03	7.3	410										
MORRIS CREEK	KANAWHA		Sep-04	7.6	190										
MORRIS CREEK	KANAWHA	15	Nov-04	7.3											
MORRIS CREEK	KANAWHA	7	Nov-04	6.9											
WILLIS BRANCH	KANAWHA		Jul-03	8.0	400										
CEDAR CREEK	LITTLE KANAWHA		Sep-03	6.9											
CEDAR CREEK	LITTLE KANAWHA		Apr-03	7.3	170	9.0									
ELLIS CREEK	LITTLE KANAWHA		Sep-03	7.3	280	10.0									
LAUREL CREEK	NEW RIVER		Oct-03	8.2	240	9.6									
WOLF CREEK	NEW RIVER		May-03	7.4	270	13.0				5.0					
BRUSH CREEK	NEW RIVER	2	Oct-04	8.2	240					15.0	2.0				80.0
BRUSH CREEK	NEW RIVER	1	Apr-03	9.8	160										
ABRAMS CREEK	NORTH BRANCH			7.0		7.6	4.0								
ELKLICK RUN	NORTH BRANCH			0.8		8.0									
NORTH FK PATTERSON CREEK	NORTH BRANCH	1		0.8		11.0									
NORTH FK PATTERSON CREEK	NORTH BRANCH	2		8.0		9.8									
PATTERSON CREEK	NORTH BRANCH			8.0		13.0									
LITTLE MILL CREEK	OHIO (MIDDLE)		May-04	8.3	123					0.0					
STEWARTS RUN	OHIO (MIDDLE)		Jul-04	8.3	412										
UNT HUGHES RIVER	OHIO (MIDDLE)		Apr-03	8.2	140	9.6									
TOMLINSON RUN	OHIO (UPPER)		Mar-03	8.2	380	9.0									
BACK CREEK	POTOMAC DIRECT	3	Jul-04	7.0											
KATES RUN	POTOMAC DIRECT		Jun-04	9.0											
OPEQUON CREEK	POTOMAC DIRECT	2	Jul-04	8.5	512										
OPEQUON CREEK	POTOMAC DIRECT	1	Oct-03	9.4	620	13.0									
RATTLESNAKE RUN	POTOMAC DIRECT	2	Sep-03	7.7		6.4									
RATTLESNAKE RUN	POTOMAC DIRECT	1	Apr-03	8.4	483	10.6									
SLEEPY CREEK	POTOMAC DIRECT	2	Jun-04	5.5											
TUSCARORA CREEK	POTOMAC DIRECT	1	Jul-04	6.0											
TUSCARORA CREEK	POTOMAC DIRECT	2	Apr-04	7.4	680										
SOUTH BRANCH POTOMAC	SOUTH BRANCH		Oct-04	8.0		9.0							73	100.0	
SOUTH BRANCH POTOMAC	SOUTH BRANCH		Oct-04	8.0		12.1							42	118.0	
SOUTH BRANCH POTOMAC	SOUTH BRANCH		Oct-04	8.0		10.0							33	100.0	
ANDERSON RUN	SOUTH BRANCH			8.0		12.0					1.0				
BIG RUN	SOUTH BRANCH	1	Jun-04	8.5	130										
BIG RUN	SOUTH BRANCH	2	Aug-04	8.0	130	9.6									
BIG RUN	SOUTH BRANCH	1	Apr-04		161										
CLIFFORD HOLLOW	SOUTH BRANCH			7.0		10.1									
DUMPLING RUN	SOUTH BRANCH			7.0		10.0									
FORT RUN	SOUTH BRANCH			7.0		12.0									
NORTH FORK	SOUTH BRANCH		Oct-04	8.0		9.2							145		
SOUTH MILL CREEK	SOUTH BRANCH		Jul-03	7.6	270	9.1									

STREAM	BASIN	STATION	DATE							WATER	CHEMISTRY	<u> </u>			
STREAM	DASIN	STATION	DAIL	РН	COND	DO	IRON	AL	MN	PHOSPHATE	NITRATE	ACID	FECAL	HARDNESS	ALKALINE
SPRING RUN	SOUTH BRANCH	1	Jul-03	8.4	241	10.1				0.0					
SPRING RUN	SOUTH BRANCH	2	Jul-03	8.4	283	9.7				0.0					
SPRING RUN	SOUTH BRANCH	3	Jul-03	8.4	280	10.0									
SPRING RUN	SOUTH BRANCH	4	Jul-03	7.9	292	10.1									
SOUTH FORK	SOUTH BRANCH		Oct-04	7.0		8.3							145	100.0	
TOMBS HOLLOW RUN	SOUTH BRANCH			8.0	201	11.5									
WALNUT BOTTOM	SOUTH BRANCH	1		8.0		7.2	1 mg/L								
WALNUT BOTTOM	SOUTH BRANCH	2		8.3	207	11.0									
BRADSHAW CREEK	TUG FORK	2	Mar-03	8.5		8.0									
BRADSHAW CREEK	TUG FORK	1	Mar-03	8.5		8.0									
DRY FORK	TUG FORK		Apr-03	8.0		6.0									
ELKHORN CREEK	TUG FORK		Mar-03	8.5		6.0									
TWIN BRANCH	TUG FORK		Oct-03	8.0		10.0									
LEADING CREEK	TYGART VALLEY			6.0		10.4									
LEFT FK FILES CREEK	TYGART VALLEY		Jun-04	6.4	70										
LEFT FK FILES CREEK	TYGART VALLEY		May-04	7.2											
LB/LF SANDY CREEK	TYGART VALLEY	1	Jun-04	7.0											
LB/LF SANDY CREEK	TYGART VALLEY	1	Jul-03	7.0											
UNT MIDDLE FORK RIVER	TYGART VALLEY		Jul-04	6.9	44										
BOOTH CREEK	WEST FORK		Jul-03	6.2	440										
BRUSHY FORK	WEST FORK		Jul-03	8.2	774	7.8									
ELK CREEK	WEST FORK		Mar-04	7.4	640		0.5			4.0					
HELENS RUN	WEST FORK		Aug-04	8.3	670	9.2									150.0
ISAACS CREEK	WEST FORK		Jul-03	8.0	745	7.8									
KINCHELOE CREEK	WEST FORK		Jul-03	7.8	104	8.6									
LAMBERTS RUN	WEST FORK		Jun-03	7.4	560	9.8									
SALEM FORK	WEST FORK		May-03	7.6	80	9.2									
SKIN CREEK	WEST FORK		Apr-03	6.5	380										
TENMILE CREEK	WEST FORK		Sep-03	7.4	490										
TWO LICK CREEK	WEST FORK		Jul-03	7.9	171	8.6									
UNT LAMBERTS RUN	WEST FORK		May-03	6.0	810	9.1									

Appendix 3. Physical conditions

STREAM	BASIN	STATION	DATE			WATER	r		ALGAE	r	STREAMBED	FOAM
-				TEMP	CLARITY	COLOR	ODOR	COLOR	TEXTURE	ABUNDANCE		
BAKERS RUN	CACAPON	1		42.8								
BAKERS RUN	CACAPON	2		63.1								
BAKERS RUN	CACAPON	3		63.1								
BAKERS RUN	CACAPON	4	May-04		MURKY	BROWN	MUSKY	DARK GREEN	EVEN COATING	IN SPOTS	BROWN	NONE
LONG LICK RUN	CACAPON			64.0								
LOST RIVER	CACAPON	1		77.0								
LOST RIVER	CACAPON	2		77.0				BROWN	EVEN COATING	IN SPOTS		
SAUERKRAUT RUN	CACAPON	1		60.8								
SAUERKRAUT RUN	CACAPON	2		61.0								
TROUT RUN	CACAPON	1		55.0								
TROUT RUN	CACAPON	2		55.0								
WAITES RUN	CHEAT			52.0								
BEAVER CREEK	CHEAT	3-1	Aug-03	65.0	CLEAR	NONE	NONE	DARK GREEN	MATTED	IN SPOTS	BROWN	SLIGHT
BEAVER CREEK	CHEAT	3-2	Jul-03	62.0	CLEAR	NONE	NONE	DARK GREEN	HAIRY	IN SPOTS	BROWN/BLACK	
BEAVER CREEK	CHEAT	3-3	Jul-03	63.0	CLEAR	NONE		DARK GREEN	HAIRY	IN SPOTS	BROWN/GRAY	MODERAT
BEAVER CREEK	CHEAT	3-4	Aug-03	65.0	CLEAR	NONE	NONE	BROWN	HAIRY	IN SPOTS	BROWN/ORANGE	
BEAVER CREEK	CHEAT	3-5	Aug-03	74.0	CLEAR	NONE	NONE	BROWN	HAIRY	IN SPOTS	ORANGE	
BEAVER CREEK	CHEAT	3-6	Aug-03		CLEAR	NONE	NONE	BROWN	HAIRY	IN SPOTS	BROWN	SLIGHT
BEAVER CREEK	CHEAT	3-7	Aug-03		MURKY	GRAY/WHITE	MUSKY	BROWN	HAIRY	IN SPOTS	BROWN	SLIGHT
BEAVER CREEK	CHEAT	3-1	May-04		CLEAR	NONE	SEWAGE	BROWN	EVEN COAT	IN SPOTS	BROWN	NONE
BEAVER CREEK	CHEAT	3-5	May-04	58.0	CLEAR	NONE	SEWAGE	DARK GREEN	HAIRY	IN SPOTS	BROWN	SLIGHT
BEAVER CREEK	CHEAT	3-10	May-04	60.0	CLEAR	NONE	NONE	BROWN	MATTED	IN SPOTS	BROWN	NONE
BEAVER CREEK	CHEAT	3-9	May-04		CLEAR	NONE	NONE	BROWN	MATTED	IN SPOTS	BROWN	NONE
BEAVER CREEK	CHEAT	3-8	May-04	66.0	MURKY	ORANGE	NONE	BROWN	EVEN COATING	IN SPOTS	Orange	NONE
BUFFALO RUN	CHEAT	1-2	Apr-04	59.5	CLEAR	NONE	NONE	BROWN	EVEN COATING	IN SPOTS	BROWN	NONE
BUFFALO RUN	CHEAT	1-1	Aug-03	70.0	CLEAR	NONE	NONE	DARK GREEN	EVEN COATING	IN SPOTS	BROWN	
BUFFALO RUN	CHEAT	1-2	Aug-03	8.0	MURKY	NONE	NONE	LIGHT GREEN	HAIRY	IN SPOTS	BROWN	
BUFFALO RUN	CHEAT	1-3	Aug-03	66.0	CLEAR	NONE	NONE	DARK GREEN	MATTED	IN SPOTS	BROWN	
BUFFALO RUN	CHEAT	1-4	Aug-03		CLEAR	NONE	NONE	DARK GREEN	EVEN COATING	IN SPOTS	BROWN	
BUFFALO RUN	CHEAT	1-5	Aug-03		CLEAR	NONE	NONE	DARK GREEN	EVEN COATING	IN SPOTS	BROWN/BLACK	
BUFFALO RUN	CHEAT	1-6	Aug-03		CLEAR	NONE	NONE			NONE	BROWN/BLACK	
BUFFALO RUN	CHEAT	1-7	Jul-03				SEWAGE	DARK GREEN	EVEN COATING	IN SPOTS	BROWN/BLACK	
BUFFALO RUN	CHEAT		Oct-04	46.0	CLEAR	NONE	NONE	BROWN	EVEN COATING	IN SPOTS	BROWN	NONE
BUFFALO RUN	CHEAT	1-1	May-04		MURKY	Brown	NONE	DARK GREEN	EVEN COATING	IN SPOTS		NONE
BUFFALO RUN	CHEAT	1-3			MURKY	GRAY/WHITE	NONE				GRAY/WHITE	NONE
BUFFALO RUN	CHEAT	1-5	May-04		MURKY	GREEN	NONE				BROWN/ORANGE	NONE
BUFFALO RUN	CHEAT	1-6	May-04		MURKY	BROWN	MUSKY				BROWN	NONE
BUFFALO RUN	CHEAT	1-7	May-04		MURKY	NONE	NONE				BROWN	NONE
GLADY FORK	CHEAT	<u> </u>	Aug-04		CLEAR	NONE	NONE	DARK GREEN	EVEN COATING	IN SPOTS	BROWN	SLIGHT
GLADE RUN	CHEAT	4-1	Jul-03		MURKY	BROWN	NONE	BROWN			BROWN/ORANGE	OLIGITI
IOL/IDL IXUN	OI ILA I	4-1	บนเ-บบ	00.0	MOIVE	DIVOMIA	INOINL	DIVOMIA	LVLIN COATING		DIVO MINORAINGE	1

STREAM	BASIN	STATION	DATE			WATER			ALGAE		STREAMBED	FOAM
02	57.10.11	017111011	3,	TEMP	CLARITY	COLOR	ODOR	COLOR	TEXTURE	ABUNDANCE	01112/1111525	. 0,
GLADE RUN	CHEAT	4-3	Jul-03	68.0	MURKY	BROWN	NONE	BROWN	EVEN COATING	EVERYWHERE	BROWN/ORANGE	
GLADE RUN	CHEAT	4-2	May-04	52.0	CLEAR	NONE	MUSKY	DARK GREEN	HAIRY	IN SPOTS	BROWN/ORANGE	SLIGHT
GLADE RUN	CHEAT	4-3	May-04	59.0	CLEAR	NONE	MUSKY	DARK GREEN	HAIRY	EVERYWHERE	BROWN/BLACK	SLIGHT
GLADE RUN	CHEAT	4-4	May-04	62.0	CLEAR	NONE	SEWAGE	DARK/LIGHT GREEN	EVEN COATING	IN SPOTS	BROWN/ORANGE	SLIGHT
MUDDY CREEK	CHEAT	1	Jun-03	62.0	CLEAR	NONE	NONE	DARK/LIGHT GREEN	MATTED	EVERYWHERE	BROWN	
MUDDY CREEK	CHEAT	1	Jul-03	62.0	CLEAR	NONE	NONE	DARK GREEN/BROWN	MATTED	EVERYWHERE	BROWN/BLACK	SLIGHT
NORTH FK GREENS RUN	CHEAT	2-1	Jul-03		MURKY	NONE		DARK GREEN	MATTED	IN SPOTS	BROWN/BLACK	
NORTH FK GREENS RUN	CHEAT	2-2	Jul-03	62.0	CLEAR	NONE	NONE			NONE	BROWN/ORANGE	SLIGHT
NORTH FK GREENS RUN	CHEAT	2-3	Jul-03	64.0	CLEAR	NONE	NONE			NONE	BROWN/ORANGE	SLIGHT
NORTH FK GREENS RUN	CHEAT	2-4	Jul-03		CLEAR	NONE	NONE	DARK GREEN	EVEN COATING	IN SPOTS	BROWN	NONE
NORTH FK GREENS RUN	CHEAT	2-1	May-04		MURKY	BROWN	NONE	DARK GREEN	EVEN COATING	IN SPOTS	BROWN	NONE
NORTH FK GREENS RUN	CHEAT	2-2	May-04	60.0	MURKY	CLEAR/ORANGE	NONE	DARK GREEN	MATTED	IN SPOTS	BROWN/ORANGE	NONE
NORTH FK GREENS RUN	CHEAT	2-4	May-04	60.0	MURKY	GRAY/WHITE	MUSKY	DARK GREEN	EVEN COATING	IN SPOTS	BROWN/GRAY	NONE
ROARING CREEK	CHEAT	1	Jun-03	59.0	CLEAR	NONE	NONE	LIGHT GREEN/BROWN	EVEN COATING	EVERYWHERE	BROWN	
ROARING CREEK	CHEAT	2	Jul-03	55.0	CLEAR	NONE	NONE	LIGHT GREEN	EVEN COATING	IN SPOTS	BROWN	
WATKINS RUN	CHEAT	1	May-04	52.4	CLEAR	NONE	NONE	LIGHT GREEN	EVEN COATING	IN SPOTS	BROWN	
WATKINS RUN	CHEAT	2	Aug-04	62.6	CLEAR	NONE	NONE	LIGHT GREEN	EVEN COATING	IN SPOTS	BROWN	NONE
WATKINS RUN	CHEAT	2	Aug-04	60.8	CLEAR	NONE	NONE				BROWN	NONE
CLEAR FORK	COAL		Apr-04	51.2	CLEAR	NONE	NONE	LIGHT GREEN	EVEN COATING	IN SPOTS	BROWN/BLACK	NONE
BIG SPRING FORK	ELK	1	Jul-04	64.0	CLEAR	NONE	NONE	LIGHT/DARK GREEN	HAIRY	EVERYWHERE	BROWN	
CAMP CREEK	ELK	1	Jun-04	71.0	CLEAR	NONE	NONE			NONE	BROWN/GRAY	
OLD FIELD FORK	ELK	1	Apr-04	56.0	CLEAR	NONE	NONE	LIGHT/DARK GREEN	EVEN COATING	IN SPOTS	BROWN	NONE
ELK RIVER	ELK	1	Oct-03	50.0	CLEAR	NONE	NONE	LIGHT/DARK GREEN	EVEN COATING	EVERYWHERE	BROWN	NONE
ELK RIVER	ELK	1	Oct-04	56.7	CLEAR	NONE	NONE	LIGHT/DARK GREEN	HAIRY	EVERYWHERE	BROWN	NONE
ELK RIVER	ELK	2	Aug-04	80.1	CLEAR	NONE	NONE	DARK GREEN	EVEN COATING	IN SPOTS	BROWN	SLIGHT
ELKLICK RUN	GAULEY		Oct-04	58.5	CLEAR	NONE	NONE	LIGHT GREEN	EVEN COATING	IN SPOTS	BROWN	NONE
RICH CREEK	GAULEY		Mar-03	52.0								
UPPER GLADE RUN	GAULEY	1	Apr-04	50.0	CLEAR	NONE	NONE	DARK GREEN	EVEN COATING	IN SPOTS	BROWN	NONE
UPPER GLADE RUN	GAULEY	2	Jun-04	69.0	CLEAR	NONE	NONE	DARK GREEN	HAIRY	IN SPOTS	BROWN	SLIGHT
UPPER GLADE RUN	GAULEY	3	Jun-03	68.4	CLEAR	NONE	NONE	DARK GREEN	HAIRY	IN SPOTS	BROWN/BLACK	
HARTS RUN	GREENBRIER		Feb-04	37.4	CLEAR	NONE	NONE	DARK GREEN	EVEN COATING	IN SPOTS	BROWN	NONE
GREENBRIER RIVER	GREENBRIER		Jul-04		MURKY	GREEN/BROWN	NONE	BROWN	EVEN COATING	IN SPOTS	BROWN	SLIGHT
SECOND CREEK	GREENBRIER	1	Jul-04		CLEAR	NONE	NONE	DARK GREEN	EVEN COATING	EVERYWHERE	BROWN	SLIGHT
SECOND CREEK	GREENBRIER	2	Jul-03	69.0	CLEAR	NONE	NONE	DARK GREEN/BROWN	EVEN COATING	IN SPOTS	BROWN	SLIGHT
BARKERS CREEK	GUYANDOTTE		May-03	55.0	CLEAR	NONE	NONE				BROWN/BLACK	
CABIN CREEK	GUYANDOTTE		Jul-03	65.0	CLEAR	NONE	NONE				BROWN/BLACK	
DEVILS FORK	GUYANDOTTE		Jul-03		CLEAR	NONE	NONE	LIGHT GREEN	MATTED	IN SPOTS	BROWN/BLACK	
GUYANDOTTE RIVER	GUYANDOTTE		Sep-03	53.0	CLEAR		NONE	DARK GREEN	EVEN COATING	EVERYWHERE	BROWN	
SLAB FORK	GUYANDOTTE	1	Jul-03	64.0	CLEAR	NONE	NONE				BROWN/BLACK	
SLAB FORK	GUYANDOTTE	1	Oct-04	63.5	CLEAR	NONE	NONE	DARK GREEN/BROWN	EVEN COATING	EVERYWHERE	BROWN/BLACK	NONE
MANILA CREEK	KANAWHA	7	Jul-03		CLEAR	NONE	NONE				BROWN	
MANILA CREEK	KANAWHA	6	Apr-03		MURKY	ORANGE	ROTTEN EGG				ORANGE	NONE

STREAM	BASIN	STATION	DATE			WATER			ALGAE		STREAMBED	FOAM
011(E) (III)	2710111	017111011	Ditte	TEMP	CLARITY	COLOR	ODOR	COLOR	TEXTURE	ABUNDANCE	OTTENUED	1 07 1111
MANILA CREEK	KANAWHA	5	Apr-03	62.0	CLEAR	NONE	ROTTEN EGG				ORANGE	
MANILA CREEK	KANAWHA	4	Jul-03		MURKY	ORANGE	ROTTEN EGG				ORANGE	SLIGHT
MANILA CREEK	KANAWHA	3	Jul-03		CLEAR	NONE	ROTTEN EGG					SLIGHT
MANILA CREEK	KANAWHA	2	Jul-03		MURKY	NONE	ROTTEN EGG				ORANGE	SLIGHT
MANILA CREEK	KANAWHA	1	Jul-03		MURKY	NONE	ROTTEN EGG				ORANGE	
MANILA CREEK	KANAWHA	7	Apr-03		CLEAR	NONE	NONE				BROWN	
MANILA CREEK	KANAWHA		Oct-03	53.0	CLEAR	NONE	NONE	LIGHT/DARK GREEN	EVEN COATING	IN SPOTS	BROWN	NONE
POCATALICO RIVER	KANAWHA		May-03	61.4	CLEAR	NONE	NONE	DARK GREEN	HAIRY	EVERYWHERE	BROWN/GRAY	SLIGHT
TRACE FORK	KANAWHA		Aug-03	74.0	MILKY	BROWN	NONE	BROWN	EVEN COATING	IN SPOTS	BROWN	NONE
ASH BRANCH	KANAWHA		Apr-03	55.0	CLEAR	NONE	NONE	DARK GREEN	HAIRY	EVERYWHERE	BROWN	NONE
FIVEMILE FORK	KANAWHA	1	Jul-03	68.0	CLEAR	NONE	NONE			NONE	BROWN/BLACK	SLIGHT
FIVEMILE FORK	KANAWHA	2	Jul-03	66.0	CLEAR	NONE	NONE	LIGHT GREEN	HAIRY	IN SPOTS	BROWN	NONE
FROZEN BRANCH	KANAWHA		Jul-03	68.0	CLEAR	NONE				NONE	BROWN/BLACK	
GOOSE HOLLOW	KANAWHA	1	Jul-03	74.0	CLEAR	NONE	SEWAGE	BROWN	EVEN COATING	IN SPOTS	BROWN/BLACK	SLIGHT
GOOSE HOLLOW	KANAWHA	2	Jun-03	70.0	CLEAR	NONE		LIGHT GREEN	EVEN COATING	IN SPOTS	BROWN/BLACK	
HICKS HOLLOW	KANAWHA		Jun-03	68.0	CLEAR	GRAY/WHITE	SEWAGE			NONE	BROWN	SLIGHT
HORSEMILL BRANCH	KANAWHA		Jul-03	75.0	CLEAR		ROTTEN EGG	DARK GREEN	HAIRY	EVERYWHERE	ORANGE/GRAY	
HURRICANE FORK	KANAWHA		Jun-03	68.0								
KELLYS CREEK	KANAWHA	1	Jul-03	70.0	CLEAR		NONE	BROWN	EVEN COATING	IN SPOTS	BROWN/ORANGE	
KELLYS CREEK	KANAWHA	2	Jul-03	65.0	CLEAR		NONE	LIGHT GREEN	EVEN COATING	IN SPOTS	BROWN/ORANGE	
KELLYS CREEK	KANAWHA	3	Jul-03	65.0	CLEAR		NONE	Dark green/brown	EVEN COATING	Ì	BROWN/GRAY	
KELLYS CREEK	KANAWHA	4	Jun-03	69.0	CLEAR		MUSKY	LIGHT GREEN	EVEN COATING	IN SPOTS	BROWN/BLACK	
KELLYS CREEK	KANAWHA		Jun-03	65.0	CLEAR	NONE	NONE	LIGHT GREEN	EVEN COATING	IN SPOTS	BROWN	NONE
MORRIS CREEK	KANAWHA		Sep-04	68.5	CLEAR	NONE	NONE		EVEN COATING	ì	BROWN	NONE
MORRIS CREEK	KANAWHA	15	Nov-04	49.1	CLEAR	NONE	NONE	LIGHT/DARK GREEN	HAIRY	IN SPOTS	BROWN	NONE
MORRIS CREEK	KANAWHA	7	Nov-04	48.7	CLEAR	GRAY/WHITE	NONE	LIGHT GREEN	HAIRY	IN SPOTS	ORANGE	NONE
UNT LEFT FORK	KANAWHA		Jul-03		CLEAR	NONE	NONE	LIGHT GREEN	EVEN COATING	IN SPOTS	BROWN/ORANGE	
WILLIS BRANCH	KANAWHA		Jul-03	69.8	CLEAR	NONE	NONE	LIGHT GREEN/BROWN		IN SPOTS	BROWN	
CEDAR CREEK	LITTLE KANAWHA		Sep-03		MURKY	NONE	NONE	DARK GREEN	HAIRY	IN SPOTS	BROWN	SLIGHT
CEDAR CREEK	LITTLE KANAWHA		Apr-03	59.0	MURKY	NONE	NONE	DAK GREEN/BROWN	HAIRY	IN SPOTS	BROWN	
ELLIS CREEK	LITTLE KANAWHA		Sep-03	63.5	CLEAR	NONE	MUSKY	DARK GREEN	EVEN COATING	IN SPOTS	BROWN/ORANGE	NONE
LAUREL CREEK	NEW RIVER		Oct-03	51.8	CLEAR	NONE	MUSKY	DARK GREEN	EVEN COATING	Ì	BROWN/BLACK	
WOLF CREEK	NEW RIVER		May-03	54.0	CLEAR	NONE	MUSKY	DARK GREEN/BROWN	HAIRY	IN SPOTS	BROWN/BLACK	SLIGHT
BRUSH CREEK	NEW RIVER	2	Oct-04	60.3	MURKY	NONE	MUSKY	DARK GREEN	HAIRY	EVERYWHERE	BROWN	SLIGHT
BRUSH CREEK	NEW RIVER	1	Apr-03	48.0	MURKY	GREEN	MUSKY	DARK GREEN/BROWN	HAIRY	EVERYWHERE	BROWN/BLACK	NONE
DROOPING LICK CREEK	NEW RIVER		May-04		CLEAR	NONE	NONE	BROWN	EVEN COATING		BROWN	NONE
HANS CREEK	NEW RIVER		Oct-03		CLEAR	NONE	NONE				BROWN	
INDIAN CREEK	NEW RIVER		Sep-03	72.0	CLEAR	NONE	NONE				BROWN	
LITTLE KANAWHA RIVER	NORTH BRANCH		Aug-03		MURKY		MUSKY	DARK GREEN	HAIRY	IN SPOTS	BROWN	SLIGHT
ABRAMS CREEK	NORTH BRANCH			57.2								
ELKLICK RUN	NORTH BRANCH			66.2								
NORTH FK PATTERSON CREEK	NORTH BRANCH	1		43.7								

STREAM	BASIN	STATION	DATE			WATER			ALGAE		STREAMBED	FOAM
011.27	27.10.11	017111011	2,2	TEMP	CLARITY	COLOR	ODOR	COLOR	TEXTURE	ABUNDANCE	01112/111122	. 07
NORTH FK PATTERSON CREEK	NORTH BRANCH	2		37.4								
PATTERSON CREEK	NORTH BRANCH			41.9								
LITTLE MILL CREEK	OHIO (MIDDLE)		May-04	70.5	CLEAR	NONE	MUSKY	DARK GREEN/BROWN	EVEN COATING	EVERYWHERE	BROWN/BLACK	MODERATE
STEWARTS RUN	OHIO (MIDDLE)		Jul-04	79.5	CLEAR	NONE	NONE	DARK GREEN/BROWN	HAIRY	EVERYWHERE	BROWN	NONE
UNT HUGHES RIVER	OHIO (MIDDLE)		Apr-03	53.0	CLEAR	NONE	NONE	LIGHT GREEN/BROWN	HAIRY	IN SPOTS	BROWN/GRAY	
TOMLINSON RUN	OHIO (UPPER)		Mar-03	46.4	CLEAR	NONE	MUSKY	DARK GREEN	MATTED	EVERYWHERE	BROWN/GRAY	MODERATE
BACK CREEK	POTOMAC DIRECT	3	Jul-04	78.0	CLEAR	NONE	NONE			NONE	BROWN/GRAY	NONE
HARPER RUN	POTOMAC DIRECT		Jul-03	60.0	MUDDY	BROWN	MUSKY	BROWN	EVEN COATING	IN SPOTS	BROWN/BLACK	SLIGHT
HALF MILE RUN	POTOMAC DIRECT		Mar-04	56.0	CLEAR	NONE	NONE	LIGHT GREEN	HAIRY	IN SPOTS	BROWN	SLIGHT
KATES RUN	POTOMAC DIRECT		Jun-04	64.4	CLEAR	NONE	MUSKY	BROWN/RED	HIARY	EVERYWHERE	BROWN/GRAY	NONE
OPEQUON CREEK	POTOMAC DIRECT	2	Jul-04	76.5	CLEAR	NONE	NONE	LIGHT/DARK GREEN	HAIRY	IN SPOTS	BROWN	NONE
OPEQUON CREEK	POTOMAC DIRECT	1	Oct-03	60.0	CLEAR	NONE	ROTTEN EGG	LIGHT GREEN/BROWN	HAIRY	IN SPOTS	BROWN/GRAY	MODERATE
RATTLESNAKE RUN	POTOMAC DIRECT	3	Sep-03		MUDDY	BROWN	NONE	LIGHT/DARK GREEN	MATTED	IN SPOTS	BROWN	NONE
RATTLESNAKE RUN	POTOMAC DIRECT	2	Sep-03	59.0	CLEAR	BROWN/GREEN	NONE	DARK GREEN	MATTED	EVERYWHERE	BROWN	SLIGHT
RATTLESNAKE RUN	POTOMAC DIRECT	1	Apr-03	57.6	CLEAR	NONE	NONE	LIGHT GREEN	HAIRY	EVERYWHERE	BROWN	NONE
RATTLESNAKE RUN	POTOMAC DIRECT	3	Apr-03		CLEAR	NONE	NONE	LIGHT GREEN	HAIRY	IN SPOTS	BROWN	NONE
RATTLESNAKE RUN	POTOMAC DIRECT	1	Apr-03	56.0	CLEAR	NONE	NONE	LIGHT GREEN	HAIRY	IN SPOTS	BROWN	NONE
ROCKY MARSH RUN	POTOMAC DIRECT	1	Oct-03		MURKY	BROWN	NONE	BROWN	HAIRY	IN SPOTS	BROWN	NONE
ROCKY MARSH RUN	POTOMAC DIRECT	2	Apr-03		CLEAR	NONE	NONE	LIGHT/DARK GREEN	HAIRY	IN SPOTS	BROWN	NONE
SLEEPY CREEK	POTOMAC DIRECT	1	May-04	64.0	CLEAR	NONE	NONE				BROWN	
SLEEPY CREEK	POTOMAC DIRECT	2	Jun-04	73.4	MURKY	BROWN	MUSKY			NONE	BROWN	SLIGHT
SLEEPY CREEK	POTOMAC DIRECT	3	Jul-04		CLEAR	BROWN	NONE	BROWN	EVEN COATING	IN SPOTS	BROWN	NONE
SLEEPY CREEK	POTOMAC DIRECT	3	Nov-03	48.0	CLEAR	NONE	NONE				BROWN	NONE
SLEEPY CREEK	POTOMAC DIRECT	2	Aug-03		CLEAR			DARK GREEN/BROWN	HAIRY	IN SPOTS		SLIGHT
SLEEPY CREEK	POTOMAC DIRECT	1	Jul-03	74.0	CLEAR	NONE	NONE					
SLEEPY CREEK	POTOMAC DIRECT		Sep-04	74.0	CLEAR	NONE	NONE				GRAY/WHITE	NONE
TOWN RUN	POTOMAC DIRECT		Oct-03		CLEAR	NONE	NONE				BROWN/BLACK	NONE
TUSCARORA CREEK	POTOMAC DIRECT	1	Jul-04	62.0	MURKY	GRAY/WHITE	NONE	LIGHT/DARK GREEN	HAIRY	EVERYWHERE	BROWN/GREEN	SLIGHT
TUSCARORA CREEK	POTOMAC DIRECT	2	Apr-04	55.0	CLEAR	NONE	MUSKY	DARK GREEN/BROWN	MATTED	EVERYWHERE	BROWN	MODERATE
BULLSKIN RUN	SHENANDOAH	1	Nov-03		CLEAR	NONE	NONE	LIGHT/DARK GREEN	MATTED	IN SPOTS	BROWN	SLIGHT
BULLSKIN RUN	SHENANDOAH	2	Oct-03		CLEAR	NONE	NONE	LIGHT GREEN	HAIRY	IN SPOTS	BROWN	NONE
BULLSKIN RUN	SHENANDOAH	3	Nov-03		MURKY	BROWN	NONE	LIGHT GREEN	HAIRY	IN SPOTS	BROWN	NONE
ELK BRANCH	SHENANDOAH		Oct-03		MURKY	WHITE/GRAY	NONE	Dark green	MATTED	IN SPOTS	BROWN	NONE
ELK RUN	SHENANDOAH	1	May-03	63.0	CLEAR	NONE	NONE	LIGHT GREEN	MATTED	IN SPOTS		NONE
ELK RUN	SHENANDOAH	2	Oct-03		MURKY	WHITE/GRAY	MUSKY	LIGHT GREEN/GRAY	HAIRY	IN SPOTS	BROWN	SLIGHT
ELK RUN	SHENANDOAH	1	Oct-03		MURKY	WHITE/GRAY	NONE	DARK GREEN	MATTED	IN SPOTS	BROWN	NONE
EVITTS RUN	SHENANDOAH	1	May-03		CLEAR	NONE	NONE	DARK GREEN	HAIRY	IN SPOTS	BROWN	NONE
EVITTS RUN	SHENANDOAH	1	Oct-03		MURKY	BROWN	NONE	LIGHT GREEN	HAIRY	IN SPOTS	BROWN	NONE
EVITTS RUN	SHENANDOAH	2	Oct-03									
EVITTS RUN	SHENANDOAH	3	Oct-03		MURKY	WHITE/GRAY	MUSKY	LIGHT GREEN	MATTED	IN SPOTS	BROWN	SLIGHT
EVITTS RUN	SHENANDOAH	4	Apr-03	71.0	CLEAR	None	NONE	LIGHT GREEN/GRAY	FLOATING	IN SPOTS	BROWN	MODERATE
EVITTS RUN	SHENANDOAH	4	Oct-03		MURKY	WHITE/GRAY	NONE	LIGHT GREEN	HAIRY	IN SPOTS	BROWN	MODERATE

STREAM	BASIN	STATION	DATE			WATER			ALGAE		STREAMBED	FOAM
OTTEX	BAOIN	01/11/01	DATE	TEMP	CLARITY	COLOR	ODOR	COLOR	TEXTURE	ABUNDANCE	OTTE WIDED	1 07 (10)
HUBBARDS RUN	SHENANDOAH	1	Nov-03		MURKY	NONE	NONE	LIGHT GREEN	HAIRY	IN SPOTS	BROWN	SLIGHT
HUBBARDS RUN	SHENANDOAH	2	Apr-03	57.0	CLEAR	NONE	NONE	DARK GREEN	HAIRY	IN SPOTS	BROWN	NONE
SOUTH BRANCH POTOMAC	SOUTH BRANCH		Oct-04	56.0	CLEAR	NONE	MUSKY	LIGHT GREEN/BROWN	HAIRY/MATTED	EVERYWHERE	BROWN	NONE
SOUTH BRANCH POTOMAC	SOUTH BRANCH		Oct-04	56.0	CLEAR	NONE	NONE	LIGHT GREEN/BROWN	MATTED	EVERYWHERE	BROWN	SLIGHT
SOUTH BRANCH POTOMAC	SOUTH BRANCH		Oct-04	54.0	CLEAR	NONE	NONE	DARK GREEN/BROWN	EVEN COATING	EVERYWHERE	BROWN	SLIGHT
ANDERSON RUN	SOUTH BRANCH			44.6								
BIG RUN	SOUTH BRANCH	1	Jun-04	65.3	CLEAR	NONE	NONE	LIGHT/DARK GREEN	HAIRY	IN SPOTS	BROWN	NONE
BIG RUN	SOUTH BRANCH	2	Aug-04	63.9	CLEAR	NONE	NONE	DARK GREEN	HAIRY	EVERYWHERE	BROWN	NONE
BIG RUN	SOUTH BRANCH	1	Apr-04	59.9	CLEAR	NONE	NONE	LIGHT/DARK GREEN	HAIRY	EVERYWHERE	BROWN	SLIGHT
CLIFFORD HOLLOW	SOUTH BRANCH			55.9								
DUMPLING RUN	SOUTH BRANCH											
FORT RUN	SOUTH BRANCH			41.0								
NORTH FORK	SOUTH BRANCH		Oct-04	54.0	CLEAR	NONE	MUSKY	BROWN	EVEN COATING	EVERYWHERE	BROWN	NONE
SOUTH MILL CREEK	SOUTH BRANCH		Jul-03	75.0	CLEAR	NONE	MUSKY	DARK GREEN	EVEN COATING	EVERYWHERE	BROWN/GRAY	NONE
SPRING RUN	SOUTH BRANCH	1	Jul-03	57.9	CLEAR	NONE	NONE	LIGHT/DARK GREEN	HAIRY	IN SPOTS	BROWN/GRAY	NONE
SPRING RUN	SOUTH BRANCH	2	Jul-03	59.4	CLEAR	NONE	NONE	LIGHT/DARK GREEN	HAIRY	IN SPOTS	BROWN/GRAY	SLIGHT
SPRING RUN	SOUTH BRANCH	3	Jul-03	60.2	CLEAR	NONE	NONE	LIGHT/DARK GREEN	EVEN COATING	IN SPOTS	BROWN/GRAY	SLIGHT
SPRING RUN	SOUTH BRANCH	4	Jul-03	59.5	CLEAR	NONE	NONE	LIGHT/DARK GREEN	EVEN COATING	IN SPOTS	BROWN/GRAY	SLIGHT
SOUTH FORK	SOUTH BRANCH		Oct-04	56.0	CLEAR	NONE	NONE	BROWN	MATTED	IN SPOTS	BROWN	SLIGHT
TOMBS HOLLOW RUN	SOUTH BRANCH			54.1								
WALNUT BOTTOM	SOUTH BRANCH	1		82.4								
WALNUT BOTTOM	SOUTH BRANCH	2		64.2								
BRADSHAW CREEK	TUG FORK	2	Mar-03	53.6	CLEAR	NONE	MUSKY	BROWN	EVEN COATING	EVERYWHERE	BROWN	NONE
BRADSHAW CREEK	TUG FORK	1	Mar-03		CLEAR	NONE	NONE	BROWN	EVEN COATING	IN SPOTS	BROWN	NONE
DRY FORK	TUG FORK		Apr-03	59.0	CLEAR	NONE	MUSKY	BROWN	EVEN COATING	EVERYWHERE	BROWN	NONE
ELKHORN CREEK	TUG FORK		Mar-03	51.6	CLEAR	GREEN/BROWN	NONE				BROWN	NONE
TWIN BRANCH	TUG FORK		Oct-03	60.8	CLEAR	NONE	NONE	BROWN	EVEN COATING	IN SPOTS	BROWN	NONE
LEADING CREEK	TYGART VALLEY			40.1								
LEFT FK FILES CREEK	TYGART VALLEY		Jun-04	61.0	CLEAR	NONE	NONE	DARK GREEN	HAIRY	IN SPOTS	BROWN	NONE
LEFT FK FILES CREEK	TYGART VALLEY		May-04	51.8	CLEAR	NONE	NONE	LIGHT GREEN	EVEN COATING	IN SPOTS	BROWN	NONE
LEFT FK FILES CREEK	TYGART VALLEY		May-03	55.0	CLEAR	NONE	NONE	LIGHT GREEN	EVEN COATING	IN SPOTS	BROWN	None
LB/LF SANDY CREEK	TYGART VALLEY	1	Jun-04	64.4	CLEAR	NONE	NONE	BROWN	EVEN COATING	IN SPOTS		None
LB/LF SANDY CREEK	TYGART VALLEY	1	Jul-03	68.0	CLEAR	NONE	NONE	BROWN	EVEN COATING	EVERYWHERE		
LB/LF SANDY CREEK	TYGART VALLEY	2	Aug-04	60.8	CLEAR	NONE	NONE	BROWN	EVEN COATING	IN SPOTS	BROWN	NONE
LEFT FK SANDY CREEK	TYGART VALLEY		Jul-03	68.0	CLEAR	NONE	NONE	BROWN	EVEN COATING	EVERYWHERE	BROWN	
LEFT FK SANDY CREEK	TYGART VALLEY		May-03	62.6	CLEAR	NONE	NONE	BROWN	EVEN COATING	EVERYWHERE	BROWN/ORANGE	
MILLSTONE CREEK	TYGART VALLEY		May-04	48.2	CLEAR	NONE	NONE	LIGHT GREEN	EVEN COATING	IN SPOTS	BROWN	NONE
MILLSTONE CREEK	TYGART VALLEY		May-03	53.0	CLEAR			LIGHT GREEN	EVEN COATING	IN SPOTS	BROWN	
RB/LF SANDY CREEK	TYGART VALLEY	2	Jun-04	65.3	CLEAR	NONE	NONE	BROWN	EVEN COATING	EVERYWHERE	BROWN	NONE
RB/LF SANDY CREEK	TYGART VALLEY	2	May-03	62.0	CLEAR	NONE	NONE	BROWN	EVEN COATING	EVERYWHERE		
RB/LF SANDY CREEK	TYGART VALLEY	2	Jul-03	68.0	CLEAR	NONE	NONE	BROWN	EVEN COATING	EVERYWHERE	BROWN	
RB/LF SANDY CREEK	TYGART VALLEY	1	Aug-04	66.2	CLEAR	NONE	NONE	BROWN	EVEN COATING	EVERYWHERE	BROWN	NONE

STREAM	BASIN	STATION	DATE			WATER			ALGAE		STREAMBED	FOAM
				TEMP	CLARITY	COLOR	ODOR	COLOR	TEXTURE	ABUNDANCE		
UNT MIDDLE FORK RIVER	TYGART VALLEY		Jul-04	68.7	CLEAR	NONE	NONE			NONE	BROWN/WHITE	SLIGHT
BOOTH CREEK	WEST FORK		Jul-03	73.4	CLEAR	NONE	NONE	LIGHT/DARK GREEN	HAIRY	EVERYWHERE	BROWN/BLACK	SLIGHT
BRUSHY FORK	WEST FORK		Jul-03	69.4	MURKY	NONE	NONE	DARK GREEN	EVEN COATING	IN SPOTS	BROWN	NONE
ELK CREEK	WEST FORK		Mar-04	42.8	CLEAR	NONE	MUSKY	DARK GREEN/BROWN	EVEN COATING	EVERYWHERE	BROWN	SLIGHT
HELENS RUN	WEST FORK		Aug-04	67.4	CLEAR	NONE	MUSKY	DARK GREEN	HAIRY	EVERYWHERE	BROWN/GRAY	SLIGHT
ISAACS CREEK	WEST FORK		Jul-03	71.4	MURKY	NONE	NONE				ORANGE	NONE
KINCHELOE CREEK	WEST FORK		Jul-03	73.0	MURKY	NONE	NONE	DARK GREEN	HAIRY	IN SPOTS	BROWN	SLIGHT
LAMBERTS RUN	WEST FORK		Jun-03	59.2	MURKY	ORANGE	ROTTEN EGG					
SALEM FORK	WEST FORK		May-03	57.2	MURKY		NONE	DARK GREEN	EVEN COATING	IN SPOTS	BROWN	
SKIN CREEK	WEST FORK		Apr-03	59.0	CLEAR	NONE	NONE	DARK GREEN		IN SPOTS	BROWN	NONE
TENMILE CREEK	WEST FORK		Sep-03	72.0	CLEAR	NONE	NONE	DARK GREEN	HAIRY	EVERYWHERE	BROWN/ORANGE	
TWO LICK CREEK	WEST FORK		Jul-03	69.4	CLEAR	NONE	NONE	LIGHT/DARK GREEN	HAIRY	IN SPOTS	BROWN	NONE
UNT LAMBERTS RUN	WEST FORK		May-03	58.6	CLEAR	NONE	NONE	DARK GREEN	EVEN COATING	IN SPOTS	ORANGE	SLIGHT
RHINE CREEK	YOUGHIOGHENY		Apr-03		CLEAR	NONE	NONE	LIGHT/DARK GREEN	EVEN COATING	IN SPOTS	BROWN	

Appendix 4. Habitat integrity

STREAM	BASIN	STATION	DATE			CHANNEL			SEDIM	ENTATION			BANKS & E	BUFFER		INDEX	INTEGRITY
O.TALAWI	3,10114	3	5.112	ATTACHMENT	RIFFLE	VELOCITY/DEPTH	FLOW	ALTERATION	SEDIMENT DEP	EMBEDDED	INDEX	COVER	STABILITY	BUFFER	INDEX		251411
BAKERS RUN	CACAPON	1				12			10	17	68		14	14	70	67.0	SUB OPTIMAL
BAKERS RUN	CACAPON	2				9			8	11	48		16	16	80	60.0	MARGINAL
BAKERS RUN	CACAPON	3				12			11	14	63		16	12	70	65.0	SUB OPTIMAL
BAKERS RUN	CACAPON	4	May-04						18		90		15	14	73	78.3	SUB OPTIMAL
LONG LICK RUN	CACAPON					8			10	12	55		16	12	70	58.0	MARGINAL
LOST RIVER	CACAPON	1				11			15	18	83		20	18	95	82.0	OPTIMAL
LOST RIVER	CACAPON	2				11			15	18	83		20	18	95	82.0	OPTIMAL
SAUERKRAUT RUN	CACAPON	1				12			8	14	55		16	16	80	66.0	SUB OPTIMAL
SAUERKRAUT RUN	CACAPON	2				12			10	14	60		16	16	80	68.0	SUB OPTIMAL
TROUT RUN	CACAPON	1				12			11	12	58		16	14	75	65.0	SUB OPTIMAL
TROUT RUN	CACAPON	2				12			11	12	58		16	14	75	65.0	SUB OPTIMAL
WAITES RUN	CACAPON					13			13	18	78		20	16	90	80.0	OPTIMAL
BEAVER CREEK	CHEAT	3-1	Aug-03						9	10	48	14	16	18	80	67.0	SUB OPTIMAL
BEAVER CREEK	CHEAT	3-2	Jul-03						10	13	58	18	17	15	83	73.0	SUB OPTIMAL
BEAVER CREEK	CHEAT	3-3	Jul-03						13	12	63	18	20	18	93	81.0	OPTIMAL
BEAVER CREEK	CHEAT	3-4	Aug-03						1	5	15	10	10	9	48	35.0	POOR
BEAVER CREEK	CHEAT	3-5	Aug-03						16	12	70	13	15	12	67	68.0	SUB OPTIMAL
BEAVER CREEK	CHEAT	3-6	Aug-03						16	12	70	12	6	18	60	64.0	MARGINAL
BEAVER CREEK	CHEAT	3-7	Aug-03						11	13	60	15	7	20	70	66.0	SUB OPTIMAL
BEAVER CREEK	CHEAT	3-1	May-04						15	15	75	12	12	20	73	74.0	SUB OPTIMAL
BEAVER CREEK	CHEAT	3-5	May-04						16	8	60	16	14	18	80	72.0	SUB OPTIMAL
BEAVER CREEK	CHEAT	3-10	May-04						8	9	43	12	14	16	70	59.0	MARGINAL
BEAVER CREEK	CHEAT	3-9	May-04						5	6	28	10	15	16	68	52.0	MARGINAL
BEAVER CREEK	CHEAT	3-8	May-04						5	5	25	16	14	16	77	56.0	MARGINAL
BUFFALO RUN	CHEAT	1-2	Apr-04						16	13	73	6	15	4	42	54.0	MARGINAL
BUFFALO RUN	CHEAT	1-1	Aug-03						15	16	78	12	19	2	55	64.0	MARGINAL
BUFFALO RUN	CHEAT	1-2	Aug-03						16	16	80	14	20	4	63	70.0	SUB OPTIMAL
BUFFALO RUN	CHEAT	1-3	Aug-03						10	12	55	17	16	9	70	64.0	MARGINAL
BUFFALO RUN	CHEAT	1-4	Aug-03						11	11	55	20	18	13	85	73.0	SUB OPTIMAL
BUFFALO RUN	CHEAT	1-5	Aug-03						13	16	73	10	10	9	48	58.0	MARGINAL
BUFFALO RUN	CHEAT	1-6	Aug-03						10	11	53	16	20	11	78	68.0	SUB OPTIMAL
BUFFALO RUN	CHEAT	1-7	Jul-03						4	11	38	16	18	12	77	61.0	MARGINAL
BUFFALO RUN	CHEAT	1-1	May-04						13	17	75	8	13	4	42	55.0	MARGINAL
BUFFALO RUN	CHEAT	1-3	May-04						12	16	70	10	12	4	43	54.0	MARGINAL
BUFFALO RUN	CHEAT	1-5	May-04						10	12	55	8	8	4	33	42.0	POOR
BUFFALO RUN	CHEAT	1-6	May-04						11	19	75	13	13	10	60	66.0	SUB OPTIMAL
BUFFALO RUN	CHEAT	1-7	May-04						18	19	93	11	16	8	58	72.0	SUB OPTIMAL
GLADY FORK	CHEAT		Aug-04						11	16	68	15	15	16	77	73.0	SUB OPTIMAL
GLADE RUN	CHEAT	4-1	Jul-03						8	5	33	14	12	4	50	43.0	POOR
GLADE RUN	CHEAT	4-2	Jul-03						9	8	43	6	2	4	20	29.0	POOR
GLADE RUN	CHEAT	4-3	Jul-03						5	5	25	8	10	6	40	34.0	POOR

STREAM	BASIN	STATION	DATE			CHANNEL			SEDIM	ENTATION			BANKS & B	BUFFER		INDEX	INTEGRITY
01112 iiii	2, 101	017111011	57112	ATTACHMENT	RIFFLE	VELOCITY/DEPTH	FLOW	ALTERATION	SEDIMENT DEP	EMBEDDED	INDEX	COVER	STABILITY	BUFFER	INDEX		
GLADE RUN	CHEAT	4-2	May-04							6	30	14	12	2	47	42.5	POOR
GLADE RUN	CHEAT	4-3	May-04						7	3	25	12	10	4	43	36.0	POOR
GLADE RUN	CHEAT	4-4	May-04						9	20	73	2	2	2	10	35.0	POOR
MUDDY CREEK	CHEAT	1	Jun-03						14		70	17	17	12	77	75.0	SUB OPTIMAL
MUDDY CREEK	CHEAT	1	Jul-03						13	15	70	16	19	14	82	77.0	SUB OPTIMAL
NF GREENS RUN	CHEAT	2-1	Jul-03						11	16	68	16	15	15	77	73.0	SUB OPTIMAL
NF GREENS RUN	CHEAT	2-2	Jul-03						20	15	88	18	16	10	73	79.0	SUB OPTIMAL
NF GREENS RUN	CHEAT	2-3	Jul-03						15	16	78	14	18	20	87	83.0	OPTIMAL
NF GREENS RUN	CHEAT	2-4	Jul-03						6	16	55	20	18	20	97	80.0	OPTIMAL
NF GREENS RUN	CHEAT	2-1	May-04						11	13	60	10	12	4	43	50.0	MARGINAL
NF GREENS RUN	CHEAT	2-2	May-04						6	10	40	5	12	3	33	36.0	POOR
NF GREENS RUN	CHEAT	2-4	May-04						2	5	18	6	4	4	23	21.0	POOR
ROARING CREEK	CHEAT	1	Jun-03						9		45	8	12	4	40	41.3	POOR
ROARING CREEK	CHEAT	2	Jul-03						12	14	65	16	14	12	70	68.0	SUB OPTIMAL
WATKINS RUN	CHEAT	1	May-03						16	17	83	18	16	20	90	87.0	OPTIMAL
WATKINS RUN	CHEAT	2	Aug-03						16	17	83	14	14	20	80	81.0	OPTIMAL
WATKINS RUN	CHEAT	2	Aug-04						18	18	90	20	20	20	100	96.0	OPTIMAL
CLEAR FORK	COAL		Apr-04						6		30		10	6	40	36.7	POOR
BIG SPRING FORK	ELK	1	Jul-04	15	18	14	7	14	12	13	63	14	17	13	73	68.5	SUB OPTIMAL
CAMP CREEK	ELK	1	Jun-04	9	5	17	12	20	10	18	70	19	20	15	90	72.5	SUB OPTIMAL
OLD FIELD FORK	ELK	1	Apr-04	19	19	13	15	20	12	18	75	10	17	16	72	79.5	SUB OPTIMAL
ELK RIVER	ELK	1	Oct-03	20	20	15	14	20	14	13	68	13	13	18	73	80.0	OPTIMAL
ELK RIVER	ELK	1	Oct-03	19	17	15	14	20	17	19	90	15	13	19	78	84.7	OPTIMAL
ELK RIVER	ELK	2	Aug-04						15		75		13	10	58	63.3	MARGINAL
ELKLICK RUN	GAULEY		Oct-04						10	16	65	13	14	13	67	66.0	SUB OPTIMAL
RICH CREEK	GAULEY		Mar-03						10		50		15	15	75	66.7	SUB OPTIMAL
UPPER GLADE RUN	GAULEY	1	Apr-04	18	19	8	14	11	15	13	70	7	6	4	28	57.5	MARGINAL
UPPER GLADE RUN	GAULEY	2	Jun-04						15	12	68		5	3	20	43.8	POOR
UPPER GLADE RUN	GAULEY	3	Jun-03						15	12	68	8	10	4	37	49.0	POOR
HARTS RUN	GREENBRIER		Feb-04						8	18	65	11	12	12	58	61.0	MARGINAL
GREENBRIER RIVER	GREENBRIER		Jul-04						15		75		15	5	50	58.3	MARGINAL
SECOND CREEK	GREENBRIER	1	Jul-04						15		75		15	15	75	75.0	SUB OPTIMAL
SECOND CREEK	GREENBRIER	2	Jul-03						10		50		20	16	90	76.7	SUB OPTIMAL
BARKERS CREEK	GUYANDOTTE		May-03						5	15	50	15	10	7	53	52.0	MARGINAL
CABIN CREEK	GUYANDOTTE		Jul-03						10		50	20		14	85	73.3	SUB OPTIMAL
DEVILS FORK	GUYANDOTTE		Jul-03						20		100	10		10	50	66.7	SUB OPTIMAL
GUYANDOTTE RIVER	GUYANDOTTE		Sep-03						15	12	68	10	18	8	60	63.0	MARGINAL
SLAB FORK	GUYANDOTTE	1	Jul-03						15		75		10	14	60	65.0	SUB OPTIMAL
SLAB FORK	GUYANDOTTE	1	Oct-04						11		55		16	9	63	60.0	MARGINAL
ASH BRANCH	KANAWHA		Aug-03						12	12	60	4	10	20	57	58.0	MARGINAL
FIVEMILE FORK	KANAWHA	1	Apr-03						9	16	63	8	4	14	43	51.0	MARGINAL
FIVEMILE FORK	KANAWHA	2	Jul-03						10	8	45	12	10	16	63	56.0	MARGINAL

STREAM	BASIN	STATION	DATE			CHANNEL			SEDIM	ENTATION			BANKS & E	BUFFER		INDEX	INTEGRITY
011(2.11)	2,101	017111011	5,2	ATTACHMENT	RIFFLE	VELOCITY/DEPTH	FLOW	ALTERATION	SEDIMENT DEP	EMBEDDED	INDEX	COVER	STABILITY	BUFFER	INDEX		
FROZEN BRANCH	KANAWHA		Jul-03						10	12	55	15	12	19	77	68.0	SUB OPTIMAL
GOOSE HOLLOW	KANAWHA	1	Jul-03						10	16	65	17	16	15	80	74.0	SUB OPTIMAL
GOOSE HOLLOW	KANAWHA	2	Jul-03						10	10	50	10	2	2	23	34.0	POOR
HICKS HOLLOW	KANAWHA		Jun-03						6	4	25	12	10	9	52	41.0	POOR
HORSEMILL BRANCH	KANAWHA		Jun-03						6	6	30	13	14	10	62	49.0	POOR
HURRICANE FORK	KANAWHA		Jul-03						8	6	35	11	16	7	57	48.0	POOR
KELLYS CREEK	KANAWHA	1	Jun-03						12	10	55	13	10	13	60	58.0	MARGINAL
KELLYS CREEK	KANAWHA	2	Jul-03						2	6	20	15	16	6	62	45.0	POOR
KELLYS CREEK	KANAWHA	3	Jul-03						12	12	60	12	15	16	72	67.0	SUB OPTIMAL
KELLYS CREEK	KANAWHA	4	Jul-03						10	10	50	15	12	12	65	59.0	MARGINAL
KELLYS CREEK	KANAWHA		Jun-03						15	20	88	11	10	10	52	66.0	SUB OPTIMAL
MORRIS CREEK	KANAWHA		Jun-03						10	10	50		12	7	48	48.8	POOR
MORRIS CREEK	KANAWHA	15	Sep-04						14		70		12	15	68	68.3	SUB OPTIMAL
MORRIS CREEK	KANAWHA	7	Nov-04	13	19	11	20	20	13	13	65	20	18	20	97	83.5	OPTIMAL
MANILA CREEK	KANAWHA	7	Jul-03						14	18	80	11	11	14	60	68.0	SUB OPTIMAL
MANILA CREEK	KANAWHA	6	Apr-03						16	16	80	8	7	12	45	59.0	MARGINAL
MANILA CREEK	KANAWHA	5	Apr-03						8	18	65	7	4	15	43	52.0	MARGINAL
MANILA CREEK	KANAWHA	4	Jul-03						18	16	85	8	6	5	32	53.0	MARGINAL
MANILA CREEK	KANAWHA	3	Jul-03						18	15	83	8	4	9	35	54.0	MARGINAL
MANILA CREEK	KANAWHA	2	Jul-03						18	18	90	12	4	10	43	62.0	MARGINAL
MANILA CREEK	KANAWHA	1	Jul-03						18	16	85	4	6	4	23	48.0	POOR
MANILA CREEK	KANAWHA	7	Apr-03						14	18	80	11	10	14	58	67.0	SUB OPTIMAL
MANILA CREEK	KANAWHA		Oct-03						6	8	35		16	17	83	58.3	MARGINAL
POCATALICO RIVER	KANAWHA		May-03									10	12	12	57	56.7	MARGINAL
TRACE FORK	KANAWHA		Aug-03						14	12	65	9	10	12	52	57.0	MARGINAL
UNT LEFT FORK	KANAWHA		Nov-04	16	18	13	15	15	17	16	83	18	15	16	82	79.5	SUB OPTIMAL
WILLIS BRANCH	KANAWHA		Jul-03						10	10	50	14	12	18	73	64.0	MARGINAL
CEDAR CREEK	LITTLE KANAWHA		Jul-03						12	16	70	19	19	10	80	76.0	SUB OPTIMAL
CEDAR CREEK	LITTLE KANAWHA		Sep-03						12	12	60	17	14	15	77	70.0	SUB OPTIMAL
ELLIS CREEK	LITTLE KANAWHA		Apr-03						8	12	50	13	14	16	72	63.0	MARGINAL
LITTLE KANAWHA RIVER	LITTLE KANAWHA		Sep-03	10	2	6	16	17	2	8	25	4	4	4	20	37.0	POOR
ABRAMS CREEK	NORTH BRANCH					5			7	3	25		14	12	65	41.0	POOR
ELKLICK RUN	NORTH BRANCH					7			8	12	50		14	11	63	52.0	MARGINAL
NF PATTERSON CREEK	NORTH BRANCH	1				15			10	18	70		16	16	80	75.0	SUB OPTIMAL
NF PATTERSON CREEK	NORTH BRANCH	2				5			10	13	58		14	13	68	55.0	MARGINAL
PATTERSON CREEK	NORTH BRANCH					14			13	17	75		18	17	88	79.0	SUB OPTIMAL
BRUSH CREEK	NEW	2	Oct-04						16		80		17	12	73	76.7	SUB OPTIMAL
BRUSH CREEK	NEW	1	Apr-03	18	18	16	18	8	12	16	70	12	17	14	72	74.5	SUB OPTIMAL
DROOPING LICK CREEK	NEW		May-04						14		70		15	10	63	65.0	SUB OPTIMAL
HANS CREEK	NEW		Oct-03						14		70		7	5	30	43.3	POOR
INDIAN CREEK	NEW		Sep-03						17		85		16	17	83	83.3	OPTIMAL
LAUREL CREEK	NEW		Oct-03						12	10	55	14	14	13	68	63.0	MARGINAL

STREAM	BASIN	STATION	DATE			CHANNEL			SEDIM	ENTATION			BANKS & E	UFFER		INDEX	INTEGRITY
STILLAW	BASIN	STATION	DATE	ATTACHMENT	RIFFLE	VELOCITY/DEPTH	FLOW	ALTERATION	SEDIMENT DEP	EMBEDDED	INDEX	COVER	STABILITY	BUFFER	INDEX	INDLX	INTEGRITI
WOLF CREEK	NEW		May-03						18	17	88	4	9	4	28	52.0	MARGINAL
LITTLE MILL CREEK	MIDDLE OHIO		May-04						10		50		18	15	83	71.7	SUB OPTIMAL
STEWARTS RUN	MIDDLE OHIO		Jul-04						10		50		16	18	85	73.3	SUB OPTIMAL
UNT HUGHES RIVER	MIDDLE OHIO		Apr-03						10		50	20		16	90	76.7	SUB OPTIMAL
TOMLINSON RUN	UPPER OHIO		Mar-03						9	10	48	12	13	11	90	55.0	MARGINAL
BACK CREEK	POTOMAC DIRECT	3	Jul-04						11		55		13	14	68	63.3	MARGINAL
HARPER RUN	POTOMAC DIRECT		Jul-03	14	13	16	18	8	5	9	35	20	20	20	100	71.5	SUB OPTIMAL
HALF MILE RUN	POTOMAC DIRECT		Mar-04						11		55		20	18	95	81.7	OPTIMAL
KATES RUN	POTOMAC DIRECT		Jun-04	18	10	16	15	20	10	16	65	20	20	20	100	82.5	OPTIMAL
OPEQUON CREEK	POTOMAC DIRECT	2	Jul-04						8		40	8	6	4	30	32.5	POOR
OPEQUON CREEK	POTOMAC DIRECT	1	Oct-03						6	8	35	10	8	3	35	35.0	POOR
RATTLESNAKE RUN	POTOMAC DIRECT	2	Sep-03						15	13	70	17	17	4	63	66.0	SUB OPTIMAL
RATTLESNAKE RUN	POTOMAC DIRECT	1	Apr-03						16	13	73	15	18	4	62	66.0	SUB OPTIMAL
RATTLESNAKE RUN	POTOMAC DIRECT	3	Apr-03						15	15	75			5	25	58.3	MARGINAL
SLEEPY CREEK	POTOMAC DIRECT	1	May-04						15		75		20	15	58	83.3	OPTIMAL
SLEEPY CREEK	POTOMAC DIRECT	2	Jun-04						8		40		11	13	40	53.3	MARGINAL
SLEEPY CREEK	POTOMAC DIRECT	3	Jul-04						11		55		12	12	40	58.3	MARGINAL
SLEEPY CREEK	POTOMAC DIRECT	3	Nov-03						15		75		20	12	53	78.3	SUB OPTIMAL
SLEEPY CREEK	POTOMAC DIRECT	2	Aug-03						15		75		15	10	42	66.7	SUB OPTIMAL
SLEEPY CREEK	POTOMAC DIRECT	1	Jul-03						15		75		10	10	33	58.3	MARGINAL
SLEEPY CREEK	POTOMAC DIRECT		Sep-04						20		100	20	18		95	96.7	OPTIMAL
TUSCARORA CREEK	POTOMAC DIRECT	1	Jul-04						15		75		20	10	75	75.0	SUB OPTIMAL
TUSCARORA CREEK	POTOMAC DIRECT	2	Apr-04						12	10	55	7	9	2	30	40.0	POOR
ANDERSON RUN	SOUTH BRANCH					3			10	3	33		14	11	63	54.0	MARGINAL
BIG RUN	SOUTH BRANCH	1	Jun-04			-			14		70		13	16	73	71.7	SUB OPTIMAL
BIG RUN	SOUTH BRANCH	2	Aug-04	12	12	15	10	15	10	13	58	11	14	17	70	64.5	MARGINAL
BIG RUN	SOUTH BRANCH	1	Apr-04						12		60		8	10	45	50.0	MARGINAL
CLIFFORD HOLLOW	SOUTH BRANCH					12			13	16	73		18	17	88	76.0	SUB OPTIMAL
DUMPLING RUN	SOUTH BRANCH					7			10	12	55		14	14	70	57.0	Marginal
FORT RUN	SOUTH BRANCH					12			10	17	68		14	15	73	68.0	SUB OPTIMAL
NORTH FORK	SOUTH BRANCH		Oct-04						16		80		20	17	93	88.3	OPTIMAL
SOUTH BRANCH	SOUTH BRANCH		Oct-04						14		70		13	5	45	53.3	MARGINAL
SOUTH BRANCH	SOUTH BRANCH		Oct-04						12		60		14	14	70	66.7	SUB OPTIMAL
SOUTH BRANCH	SOUTH BRANCH		Oct-04						17		85		16	17	83	83.3	OPTIMAL
SOUTH MILL CREEK	SOUTH BRANCH		Jul-03	12	19	10	16	18	17	15	80	15	15	8	63	72.5	SUB OPTIMAL
SPRING RUN	SOUTH BRANCH	1	Jul-03	· -					16	14	75	18	17	16	85	81.0	OPTIMAL
SPRING RUN	SOUTH BRANCH	2	Jul-03				İ		16	15	78	16	18	13	78	78.0	SUB OPTIMAL
SPRING RUN	SOUTH BRANCH	3	Jul-03						18	15	83	16	20	15	85	84.0	OPTIMAL
SPRING RUN	SOUTH BRANCH	4	Jul-03						19	18	93	14	13	8	58	72.0	SUB OPTIMAL
SOUTH FORK	SOUTH BRANCH	-	Oct-04						9	10	45	1-7	11	11	55	51.7	MARGINAL
TOMBS HOLLOW RUN	SOUTH BRANCH		00:07			7			10	12	55		14	16	75	59.0	MARGINAL
WALNUT BOTTOM	SOUTH BRANCH	1				6			6	7	33		16	14	75	50.0	MARGINAL
WALNUT BUTTOM	JOU III DRANCH		<u> </u>	<u>I</u>	L	U	L	l .	ı v	, , , , , , , , , , , , , , , , , , ,	JJ	l	10	14	13		IVIANGINAL

STREAM	BASIN	STATION	DATE			CHANNEL			SEDIM	ENTATION			BANKS & E	BUFFER		INDEX	INTEGRITY
OTTLE III	<i>B</i> /(Gil4	OTATION	DATE	ATTACHMENT	RIFFLE	VELOCITY/DEPTH	FLOW	ALTERATION	SEDIMENT DEP	EMBEDDED	INDEX	COVER	STABILITY	BUFFER	INDEX	III DEX	IIVI ZOIVI I
WALNUT BOTTOM	SOUTH BRANCH	2				7			8	11	48		16	16	80	58.0	MARGINAL
EVITTS RUN	SHENANDOAH	4	Apr-03						12	11	58	18	18	6	70	65.0	SUB OPTIMAL
HUBBARDS RUN	SHENANDOAH	2	Apr-03						14	10	60	10	10	4	40	48.0	POOR
BRADSHAW CREEK	TUG FORK	2	Mar-03						15		75		10	5	38	50.0	MARGINAL
BRADSHAW CREEK	TUG FORK	1	Mar-03						20		100		5	5	25	50.0	MARGINAL
DRY FORK	TUG FORK		Apr-03						15		75		15	10	63	66.7	SUB OPTIMAL
ELKHORN CREEK	TUG FORK		Mar-03						10		50		15	10	63	58.3	MARGINAL
TWIN BRANCH	TUG FORK		Oct-03						5		25		15	10	63	50.0	MARGINAL
LEADING CREEK	TYGART VALLEY					9			10	13	58		14	11	63	57.0	MARGINAL
LF FILES CREEK	TYGART VALLEY		Jun-04						13	18	78		14	10	60	68.8	SUB OPTIMAL
LF FILES CREEK	TYGART VALLEY		May-04						15		75		10	15	63	66.7	SUB OPTIMAL
LF FILES CREEK	TYGART VALLEY		May-03						15		75	15	10		63	66.7	SUB OPTIMAL
LB/LF SANDY CREEJ	TYGART VALLEY	1	Jun-04							16	80	6	10	10	43	52.5	MARGINAL
LB/LF SANDY CREEJ	TYGART VALLEY	1	Jul-03							16	80	8	10		45	56.7	MARGINAL
LB/LF SANDY CREEJ	TYGART VALLEY	2	Aug-04							16	80	6	10	10	43	52.5	MARGINAL
LF SANDY CREEK	TYGART VALLEY		Jul-03							16	80	2		2	10	33.3	POOR
LF SANDY CREEK	TYGART VALLEY		May-03						16	16	80	2		2	10	45.0	POOR
MILLSTONE CREEK	TYGART VALLEY		May-04						15		75		20	20	100	91.7	OPTIMAL
MILLSTONE CREEK	TYGART VALLEY		May-03						20		100		20	15	88	91.7	OPTIMAL
RB/LF SANDY CREEK	TYGART VALLEY	2	Jun-04							14	35	16	14	14	73	72.5	SUB OPTIMAL
RB/LF SANDY CREEK	TYGART VALLEY	2	May-03							16	40	4		10	35	50.0	MARGINAL
RB/LF SANDY CREEK	TYGART VALLEY	2	Jul-03						16	14	75	16	14	14	73	74.0	SUB OPTIMAL
RB/LF SANDY CREEK	TYGART VALLEY	1	Aug-04							14	70	16	14	14	73	72.5	SUB OPTIMAL
UNT MIDDLE FORK RIVER	TYGART VALLEY		Jul-04	18	20	10	12	18	10	12	55	13	16	13	70	71.0	SUB OPTIMAL
BOOTH CREEK	WEST FORK		Jul-03						3	12	38	12	7	14	55	48.0	POOR
BRUSHY FORK	WEST FORK		Jul-03	16	15	14	16	19	10	15	63	17	12	15	73	74.5	SUB OPTIMAL
ELK CREEK	WEST FORK		Mar-04						3	14	43	17	15	13	75	62.0	MARGINAL
HELENS RUN	WEST FORK		Aug-04						4		20		16	5	53	41.7	POOR
ISAACS CREEK	WEST FORK		Jul-03	14	9	12	14	19	11	15	65	14	8	10	53	63.0	MARGINAL
KINCHELOE CREEK	WEST FORK		Jul-03	9	12	11	15	18	11	11	55	7	11	6	40	55.5	MARGINAL
LAMBERTS RUN	WEST FORK		Jun-03	20	20	8	20	19	15	17	80	14	15	18	78	83.0	OPTIMAL
SALEM FORK	WEST FORK		May-03	12	5	10	10	20	12	11	58	14	14	20	80	64.0	MARGINAL
SKIN CREEK	WEST FORK		Apr-03						10	10	50	9	11	14	57	54.0	MARGINAL
TENMILE CREEK	WEST FORK		Sep-03	10	10	12	7	16	8	16	60	10	10	14	57	56.5	MARGINAL
TWO LICK CREEK	WEST FORK		Jul-03	18	17	10	15	20	16	15	78	13	11	11	58	69.5	SUB OPTIMAL
RHINE CREEK	YOUGHIOGHENY		Apr-03						15	15	75	20	10	20	83	80.0	OPTIMAL

Appendix 5. Biological integrity

STREAM	BASIN	STATION	DATE				METRICS				STREAM INDEX	INTEGRITY
STREAM	DASIN	STATION	DATE	TOTAL TAXA	EPT TAXA	% EPT		% DOMINANT	% MIDGE	SOS INDEX	STREAM INDEX	INTEGRIT
BAKERS RUN	CACAPON	1		15	12	80.4	3.3	28.7	6.9		87.5	OPTIMAL
BAKERS RUN	CACAPON	2		12	6	64.2	4.4	31.2	11.0		78.5	SUB OPTIMAL
BAKERS RUN	CACAPON	3		12	9	82.2	4.3	28.7	14.9		84.1	OPTIMAL
BAKERS RUN	CACAPON	4	May-04	16	9		4.8				77.4	SUB OPTIMAL
LONG LICK RUN	CACAPON			12	8	84.4	3.5	25.7	11.9		83.7	OPTIMAL
LOST RIVER	CACAPON	1	Jul-02	13	9	85.6	3.7	27.5	10.1		83.9	OPTIMAL
LOST RIVER	CACAPON	2		13	9	85.5	3.7	27.5	10.1		86.3	OPTIMAL
SAUERKRAUT RUN	CACAPON	1		10	8	39.1	6.6	67.4	60.6		50.8	MARGINAL
SAUERKRAUT RUN	CACAPON	2		15	9	84.9	3.8	38.3	3.5		87.0	OPTIMAL
TROUT RUN	CACAPON	1		11	7	67.0	4.2	32.0	18.0		75.9	SUB OPTIMAL
TROUT RUN	CACAPON	2		11	7	66.0	4.3	31.1	17.5		76.5	SUB OPTIMAL
WAITES RUN	CACAPON			16	11	78.6	2.7	26.2	2.4		87.0	OPTIMAL
BEAVER CREEK	CHEAT	3-1	Aug-03	7	5		2.8				57.3	MARGINAL
BEAVER CREEK	CHEAT	3-2	Jul-03	19	11	66.7	4.3	48.5	3.0		83.4	OPTIMAL
BEAVER CREEK	CHEAT	3-3	Jul-03	13	7	80.2	3.9	74.9	0.0		71.3	SUB OPTIMAL
BEAVER CREEK	CHEAT	3-4	Aug-03	5	3		4.3				44.4	POOR
BEAVER CREEK	CHEAT	3-5	Aug-03	5	4		4.4				50.3	MARGINAL
BEAVER CREEK	CHEAT	3-6	Aug-03	9	4		4.6				44.9	POOR
BEAVER CREEK	CHEAT	3-7	Aug-03	16	8		3.8	62.5	0.0		77.3	OPTIMAL
BEAVER CREEK	CHEAT	3-1	May-04	10	6		3.3				63.2	MARGINAL
BEAVER CREEK	CHEAT	3-5	May-04	14	9	84.8	2.9	53.3	0.5		82.8	OPTIMAL
BEAVER CREEK	CHEAT	3-10	May-04	12	9		1.9				75.4	SUB OPTIMAL
BEAVER CREEK	CHEAT	3-9	May-04	9	5		3.8				56.7	MARGINAL
BEAVER CREEK	CHEAT	3-8	May-04	3	1		6.8				22.6	POOR
BUFFALO RUN	CHEAT	1-2	Apr-04	16	12	92.8	3.4	21.6	0.0		93.8	OPTIMAL
BUFFALO RUN	CHEAT	1-1	Aug-03	13	6	81.1	4.7	66.2	0.0		70.4	SUB OPTIMAL
BUFFALO RUN	CHEAT	1-2	Aug-03	20	11	85.2	3.6	46.5	6.0		89.7	OPTIMAL
BUFFALO RUN	CHEAT	1-3	Aug-03	12	6	96.0	2.6	94.0	1.5		68.7	SUB OPTIMAL
BUFFALO RUN	CHEAT	1-4	Aug-03	10	5	89.0	3.3	87.4	0.4		67.4	SUB OPTIMAL
BUFFALO RUN	CHEAT	1-5	Aug-03	13	6	65.9	4.6				61.7	MARGINAL
BUFFALO RUN	CHEAT	1-6	Aug-03	16	9	77.2	4.0	34.4	3.1		84.9	OPTIMAL
BUFFALO RUN	CHEAT	1-7	Jul-03	16	7	84.1	4.8	68.8	0.0		73.7	SUB OPTIMAL
BUFFALO RUN	CHEAT		Oct-04							5.7	61.4	MARGINAL
BUFFALO RUN	CHEAT	1-1	May-04	14	9	52.9	3.4	63.0	5.9		73.0	SUB OPTIMAL
BUFFALO RUN	CHEAT	1-3	May-04	10	6		2.6				64.6	MARGINAL
BUFFALO RUN	CHEAT	1-5	May-04	10	5	94.1	1.5				78.3	SUB OPTIMAL
BUFFALO RUN	CHEAT	1-6	May-04	15	10	91.0	2.0	64.3	3.2		83.0	OPTIMAL
BUFFALO RUN	CHEAT	1-7	May-04	5	3		1.4				50.0	MARGINAL
GLADY FORK	CHEAT		Aug-04			68.5	3.8	25.0	0.3		86.1	OPTIMAL
GLADE RUN	CHEAT	4-1	Jul-03	10	2	15.1	7.2	76.2	66.7		31.3	POOR

STREAM	BASIN	STATION	DATE				METRICS				STREAM INDEX	INTEGRITY
STREAM	BASIN	STATION	DATE	TOTAL TAXA	EPT TAXA	% EPT	•	% DOMINANT	% MIDGE	SOS INDEX	STREAM INDEX	INTEGRITY
GLADE RUN	CHEAT	4-2	Jul-03	7	2	7.8	7.6	84.9	17.3		33.0	POOR
GLADE RUN	CHEAT	4-3	Jul-03	9	2	19.7	6.8	69.2	8.4		43.9	POOR
GLADE RUN	CHEAT	4-2	May-04	12	4		6.4				48.2	POOR
GLADE RUN	CHEAT	4-3	May-04	7	2		4.7				42.5	POOR
GLADE RUN	CHEAT	4-4	May-04	7	3	54.5	3.6	52.3	21.6		59.4	MARGINAL
MUDDY CREEK	CHEAT	1	Jun-03	16	9		3.1				81.3	OPTIMAL
MUDDY CREEK	CHEAT	1	Jul-03	16	9	86.9	3.4				88.3	OPTIMAL
NF GREENS RUN	CHEAT	2-1	Jul-03	7	3		4.0				47.4	POOR
NF GREENS RUN	CHEAT	2-2	Jul-03	9	5	88.2	3.4	73.8	2.9		68.4	SUB OPTIMAL
NF GREENS RUN	CHEAT	2-3	Jul-03	7	4	88.6	3.7				51.4	MARGINAL
NF GREENS RUN	CHEAT	2-1	May-04	4	2		3.2				43.8	POOR
NF GREENS RUN	CHEAT	2-2	May-04	5	4		3.1				51.1	MARGINAL
ROARING CREEK	CHEAT	1	Jun-03	16	10		4.3				78.2	OPTIMAL
ROARING CREEK	CHEAT	2	Jul-03	16	11		3.9				82.6	OPTIMAL
WATKINS RUN	CHEAT	1	May-03	14	9		3.2				80.7	OPTIMAL
WATKINS RUN	CHEAT	2	Aug-03	18	8	31.9	4.4	43.2	2.4		75.3	SUB OPTIMAL
WATKINS RUN	CHEAT	2	Aug-04	18	8	38.4	4.4				76.0	SUB OPTIMAL
CLEAR FORK	COAL		Apr-04							5.1	70.0	SUB OPTIMAL
BIG SPRING FORK	ELK	1	Jul-04	14	8	73.2	4.0	48.4	8.9		78.6	SUB OPTIMAL
CAMP CREEK	ELK	1	Jun-04	17	8	87.8	3.2				72.5	OPTIMAL
OLD FIELD FORK	ELK	1	Apr-04	15	10	92.8	3.4	25.7	3.4		91.2	OPTIMAL
ELK RIVER	ELK	1	Oct-03	17	10	95.4	3.4				90.4	OPTIMAL
ELK RIVER	ELK	1	Oct-04	14	8	94.3	3.3	29.6	1.2		88.8	OPTIMAL
ELK RIVER	ELK	2	Aug-04	16						4.8	78.4	OPTIMAL
ELKLICK RUN	GAULEY		Oct-04	12	8	94.0	2.9				86.2	OPTIMAL
RICH CREEK	GAULEY		Mar-03	14						4.5	72.7	SUB OPTIMAL
UPPER GLADE RUN	GAULEY	1	Apr-04	12	7	68.9	4.7	35.9	5.7		75.3	SUB OPTIMAL
UPPER GLADE RUN	GAULEY	2	Jun-04							5.4	66.2	SUB OPTIMAL
UPPER GLADE RUN	GAULEY	3	Jun-03	15	7		5.0				65.5	SUB OPTIMAL
HARTS RUN	GREENBRIER		Feb-04	12	9	82.5	3.6				78.9	SUB OPTIMAL
GREENBRIER RIVER	GREENBRIER		Jul-04	10						4.1	66.0	SUB OPTIMAL
SECOND CREEK	GREENBRIER	1	Jul-04	10						4.0	66.4	SUB OPTIMAL
SECOND CREEK	GREENBRIER	2	Jul-03				4.6				77.1	SUB OPTIMAL
BARKERS CREEK	GUYANDOTTE		May-03	9	6		4.7				56.9	MARGINAL
CABIN CREEK	GUYANDOTTE		Jul-03							4.8	74.3	SUB OPTIMAL
DEVILS FORK	GUYANDOTTE		Jul-03							4.7	75.7	SUB OPTIMAL
GUYANDOTTE RIVER	GUYANDOTTE		Sep-03	8	5	80.0	3.9				70.5	SUB OPTIMAL
SLAB FORK	GUYANDOTTE	1	Jul-03							4.9	72.9	SUB OPTIMAL
SLAB FORK	GUYANDOTTE	1	Oct-04							5.5	70.4	SUB OPTIMAL
ASH BRANCH	KANAWHA		Apr-03	17	11	83.7	3.6				88.9	OPTIMAL
FIVEMILE FORK	KANAWHA	1	Jul-03	8	3	61.0	4.8				60.6	MARGINAL
FIVEMILE FORK	KANAWHA	2	Jul-03	12	4	59.5	4.6				64.4	MARGINAL

STREAM	BASIN	STATION	DATE				METRICS	}			STREAM INDEX	INTEGRITY
STREAM	BASIN	STATION	DAIL	TOTAL TAXA	EPT TAXA	% EPT	HILSENHOFF	% DOMINANT	% MIDGE	SOS INDEX	3 TREAM INDEX	INTEGRATI
FROZEN BRANCH	KANAWHA		Jul-03	10	5	76.5	4.9				67.2	SUB OPTIMAL
GOOSE HOLLOW	KANAWHA	1	Jul-03	13	5	68.9	5.4				67.1	SUB OPTIMAL
GOOSE HOLLOW	KANAWHA	2	Jun-03	11	2	59.7	5.1				60.0	MARGINAL
HICKS HOLLOW	KANAWHA		Jun-03	7	5	91.2	4.9				68.5	SUB OPTIMAL
HORSEMILL BRANCH	KANAWHA		Jul-03	6	1	14.3	4.0				45.1	POOR
HURRICANE FORK	KANAWHA		Jun-03	9	3	15.2	7.7				32.5	POOR
KELLYS CREEK	KANAWHA	1	Jul-03	9	4	81.8	3.5				71.2	SUB OPTIMAL
KELLYS CREEK	KANAWHA	2	Jul-03	1	1	100.0	5.0				56.8	MARGINAL
KELLYS CREEK	KANAWHA	3	Jul-03	8	2	53.1	5.2				55.7	MARGINAL
KELLYS CREEK	KANAWHA	4	Jun-03	17	6	55.9	5.5				65.4	SUB OPTIMAL
KELLYS CREEK	KANAWHA		Jun-03	16	3		5.6				54.1	MARGINAL
MORRIS CREEK	KANAWHA		Sep-04	15	7					4.2	74.5	SUB OPTIMAL
MORRIS CREEK	KANAWHA	15	Nov-04	15	9	46.9	5.6	64.9	38.7		61.7	MARGINAL
MORRIS CREEK	KANAWHA	7	Nov-04	10	5	70.9	5.2	74.6	14.9		59.8	MARGINAL
MANILA CREEK	KANAWHA	7	Jul-03	11	2	35.7	5.4				49.8	POOR
MANILA CREEK	KANAWHA	6	Apr-03			NO	MACROINVERT	EBRATES			0.0	POOR
MANILA CREEK	KANAWHA	5	Apr-03			NO	MACROINVERT	EBRATES			0.0	POOR
MANILA CREEK	KANAWHA	4	Jul-03			NO	MACROINVERT	EBRATES			0.0	POOR
MANILA CREEK	KANAWHA	3	Jul-03			NO	MACROINVERT	EBRATES			0.0	POOR
MANILA CREEK	KANAWHA	2	Jul-03			NO	MACROINVERT	EBRATES			0.0	POOR
MANILA CREEK	KANAWHA	1	Jul-03			NO	MACROINVERT	EBRATES			0.0	POOR
MANILA CREEK	KANAWHA	7	Apr-03	12	3	26.5	5.6				50.9	MARGINAL
MANILA CREEK	KANAWHA		Oct-03	13	5	77.9	4.9	66.8	0.0		67.9	SUB OPTIMAL
POCATALICO RIVER	KANAWHA		May-03	12	4	17.5	5.8	45.6	4.4		56.9	POOR
TRACE FORK	KANAWHA		Aug-03	10						5.2	58.1	MARGINAL
UNT LEFT FORK	KANAWHA		Jul-03	6	3	50.0	5.2				51.3	MARGINAL
WILLIS BRANCH	KANAWHA		Jul-03	15	8	79.6	5.3				76.2	SUB OPTIMAL
CEDAR CREEK	LITTLE KANAWHA		Sep-03	16	4	53.5	5.1				65.1	SUB OPTIMAL
CEDAR CREEK	LITTLE KANAWHA		Apr-03	11	6	81.1	4.2				72.1	SUB OPTIMAL
ELLIS CREEK	LITTLE KANAWHA		Sep-03	18	5	34.5	6.0	48.8	31.2		63.5	MARGINAL
LITTLE KANAWHA RIVER	LITTLE KANAWHA		Aug-03	11	5	66.0	3.4				71.7	SUB OPTIMAL
ABRAMS CREEK	NORTH BRANCH			9	1	2.1	7.7	71.6	58.9		28.1	POOR
ELKLICK RUN	NORTH BRANCH			13	9	53.3	4.6	51.1	1.1		72.9	SUB OPTIMAL
NF PATTERSON CREEK	NORTH BRANCH	1		8	1	78.6	4.7	84.1	0.0		55.3	MARGINAL
NF PATTERSON CREEK	NORTH BRANCH	2		13	8	77.5	5.1	33.3	18.3		76.4	SUB OPTIMAL
PATTERSON CREEK	NORTH BRANCH			17	7	36.4	5.2	40.4	32.3		67.0	SUB OPTIMAL
BRUSH CREEK	NEW	2	Oct-04	9						5.2	55.0	MARGINAL
BRUSH CREEK	NEW	1	Apr-03	10	4	74.1	4.1	36.6	12.5		70.7	SUB OPTIMAL
DROOPING LICK CREEK	NEW		May-04	14						5.1	68.7	SUB OPTIMAL
HANS CREEK	NEW		Oct-03							4.4	80.0	OPTIMAL
INDIAN CREEK	NEW		Sep-03			29.3	4.7				68.5	SUB OPTIMAL

STREAM	BASIN	STATION	DATE				METRICS				STREAM INDEX	INTEGRITY
OTTE TIVE	B/\OII\	017111011	DATE	TOTAL TAXA	EPT TAXA	% EPT	HILSENHOFF	% DOMINANT	% MIDGE	SOS INDEX	OTTEN IN INDEX	INTEGRATI
LAUREL CREEK	NEW		Oct-03			82.8	5.0				87.8	OPTIMAL
WOLF CREEK	NEW		May-04	9	5	29.4	5.5				57.7	MARGINAL
LITTLE MILL CREEK	MIDDLE OHIO		May-04	17	6		5.2				73.8	SUB OPTIMAL
STEWARTS RUN	MIDDLE OHIO		Jul-04	10						4.7	62.9	MARGINAL
UNT HUGHES RIVER	MIDDLE OHIO		Apr-03	14						5.5	67.2	SUB OPTIMAL
TOMLINSON RUN	UPPER OHIO		Mar-03	15	5	9.5	7.5				35.5	POOR
BACK CREEK	POTOMAC DIRECT	3	Jul-04	13						4.0	73.8	SUB OPTIMAL
ELK BRANCH	POTOMAC DIRECT		Oct-03	15	5	49.3	4.4	49.9	12.0		69.4	SUB OPTIMAL
ELK RUN	POTOMAC DIRECT	1	May-03	16	7	13.1	4.9	40.9	21.0		63.4	MARGINAL
ELK RUN	POTOMAC DIRECT	2	Oct-03	15	5	31.6	4.7	47.6	2.2		67.3	SUB OPTIMAL
ELK RUN	POTOMAC DIRECT	1	Oct-03	16	6	58.5	4.8	55.6	2.6		70.8	SUB OPTIMAL
HARPER RUN	POTOMAC DIRECT		Jul-03	2	0	0.0	8.0				7.7	POOR
HALF MILE RUN	POTOMAC DIRECT		Mar-04			62.7	3.8	22.1	1.8		84.7	OPTIMAL
KATES RUN	POTOMAC DIRECT		Jun-04	10	6	67.3	4.1	36.7	16.3		72.1	SUB OPTIMAL
OPEQUON CREEK	POTOMAC DIRECT	2	Jul-04	9						5.6	52.9	MARGINAL
OPEQUON CREEK	POTOMAC DIRECT	1	Oct-03	11	3	2.9	5.8				41.4	POOR
RATTLESNAKE RUN	POTOMAC DIRECT	3	Sep-03	10	2	14.7	6.4	64.2	22.5		43.9	POOR
RATTLESNAKE RUN	POTOMAC DIRECT	2	Sep-03	9	0	0.0	6.2	74.7	26.7		32.5	POOR
RATTLESNAKE RUN	POTOMAC DIRECT	1	Apr-03	19	7	36.4	5.5	33.2	9.9		75.4	SUB OPTIMAL
RATTLESNAKE RUN	POTOMAC DIRECT	3	Apr-03	8	1	7.1	4.6	51.5	23.7		42.7	POOR
RATTLESNAKE RUN	POTOMAC DIRECT	1	Apr-03	7	0	0.0	6.3	32.9	19.8		33.8	POOR
ROCKY MARSH RUN	POTOMAC DIRECT	1	Oct-03	14	3	26.5	6.2	77.3	0.6		48.8	POOR
ROCKY MARSH RUN	POTOMAC DIRECT	2	Apr-03	12	4	34.4	6.1	69.5	42.4		50.1	MARGINAL
SLEEPY CREEK	POTOMAC DIRECT	1	May-04	16						5.1	73.1	SUB OPTIMAL
SLEEPY CREEK	POTOMAC DIRECT	2	Jun-04	15						4.3	76.4	SUB OPTIMAL
SLEEPY CREEK	POTOMAC DIRECT	3	Jul-04	14						4.5	72.7	SUB OPTIMAL
SLEEPY CREEK	POTOMAC DIRECT	3	Nov-03			31.6	3.4				76.5	SUB OPTIMAL
SLEEPY CREEK	POTOMAC DIRECT	2	Aug-03			57.5	4.7				77.3	SUB OPTIMAL
SLEEPY CREEK	POTOMAC DIRECT	1	Jul-03				5.8				60.0	MARGINAL
SLEEPY CREEK	POTOMAC DIRECT		Sep-04	14						4.9	72.4	SUB OPTIMAL
TOWN RUN	POTOMAC DIRECT		Oct-03	8	0	0.0	7.1	71.2	0.0		36.1	POOR
TUSCARORA CREEK	POTOMAC DIRECT	1	Jul-04	12						5.6	60.0	MARGINAL
TUSCARORA CREEK	POTOMAC DIRECT	2	May-03	17	5	25.5	6.1	40.0	11.1		64.9	MARGINAL
ANDERSON RUN	SOUTH BRANCH			8	5		3.8				55.1	MARGINAL
BIG RUN	SOUTH BRANCH	1	Jun-04	14	8					4.3	69.7	OPTIMAL
BIG RUN	SOUTH BRANCH	2	Aug-04	18	11	93.2	3.1	31.7	2.8		94.3	OPTIMAL
BIG RUN	SOUTH BRANCH	1	Apr-04	12	8					5.2	62.4	SUB OPTIMAL
CLIFFORD HOLLOW	SOUTH BRANCH			15	11		2.8				85.3	OPTIMAL
DUMPLING RUN	SOUTH BRANCH			8	4	87.0	3.5	54.1	4.1		69.7	SUB OPTIMAL
FORT RUN	SOUTH BRANCH			19	9	46.7	5.5	42.9	35.2		71.4	SUB OPTIMAL
NORTH FORK	SOUTH BRANCH		Oct-04	11	7	91.2	3.3	32.4	0.0		83.2	OPTIMAL
SOUTH BRANCH	SOUTH BRANCH		Oct-04	10	6	62.6	5.0	51.7	35.4		61.6	MARGINAL

STREAM	BASIN	STATION	DATE				METRICS				STREAM INDEX	INTEGRITY
STREAM	BASIN	STATION	DAIL	TOTAL TAXA	EPT TAXA	% EPT	HILSENHOFF	% DOMINANT	% MIDGE	SOS INDEX	3 TREAM INDEX	INTEGRITI
SOUTH BRANCH	SOUTH BRANCH		Oct-04	12	7	89.9	3.9	37.0	7.4		80.5	OPTIMAL
SOUTH BRANCH	SOUTH BRANCH		Oct-04	14	8	67.8	4.8	41.7	28.1		72.5	SUB OPTIMAL
SOUTH MILL CREEK	SOUTH BRANCH		Jul-03	19	11	91.4	4.2	56.7	1.0		86.7	OPTIMAL
SPRING RUN	SOUTH BRANCH	1	Jul-03	12	6		5.2				57.3	MARGINAL
SPRING RUN	SOUTH BRANCH	2	Jul-03	14	7		5.1				63.5	SUB OPTIMAL
SPRING RUN	SOUTH BRANCH	3	Jul-03	14	8		4.7				68.0	SUB OPTIMAL
SPRING RUN	SOUTH BRANCH	4	Jul-03	11	9		3.4				72.0	SUB OPTIMAL
SOUTH FORK	SOUTH BRANCH		Oct-04	14	6	74.3	4.2	38.3	20.7		74.6	SUB OPTIMAL
TOMBS HOLLOW RUN	SOUTH BRANCH			9	4	13.0	7.3	80.9	4.6		41.9	POOR
WALNUT BOTTOM	SOUTH BRANCH	1		10	6		5.7				51.7	SUB OPTIMAL
WALNUT BOTTOM	SOUTH BRANCH	2		10	7	83.7	4.5	53.5	14.0		71.2	SUB OPTIMAL
BULLSKIN RUN	SHENANDOAH	1	Nov-03	12	3	38.8	4.7	64.0	5.0		60.6	MARGINAL
BULLSKIN RUN	SHENANDOAH	2	Oct-03	14	3	32.2	5.5	52.2	7.7		61.4	MARGINAL
BULLSKIN RUN	SHENANDOAH	3	Nov-03	15	5	32.7	5.1	42.2	4.6		68.0	SUB OPTIMAL
EVITTS RUN	SHENANDOAH	1	May-03	14	8	38.6	6.4				53.1	MARGINAL
EVITTS RUN	SHENANDOAH	1	Oct-03	15	7	71.9	5.4	56.0	2.0		75.2	SUB OPTIMAL
EVITTS RUN	SHENANDOAH	2	Oct-03	12	3	46.5	5.7	57.2	6.1		56.9	MARGINAL
EVITTS RUN	SHENANDOAH	3	Oct-03	16	4	53.8	4.7	35.8	0.5		76.1	SUB OPTIMAL
EVITTS RUN	SHENANDOAH	4	Apr-03	11	6	41.3	6.1	66.0	47.6		52.0	MARGINAL
EVITTS RUN	SHENANDOAH	4	Oct-03	14	6	54.6	5.0	51.9	2.7		70.2	SUB OPTIMAL
HUBBARDS RUN	SHENANDOAH	1	Nov-03	8	1	2.1	6.0	84.4	2.1		38.8	POOR
HUBBARDS RUN	SHENANDOAH	2	Apr-03	5	1	0.5	5.5	96.5	20.4		29.4	POOR
BRADSHAW CREEK	TUG FORK	2	Mar-03							5.6	62.9	MARGINAL
BRADSHAW CREEK	TUG FORK	1	Mar-03							5.2	68.6	SUB OPTIMAL
DRY FORK	TUG FORK		Apr-03							5.6	62.9	MARGINAL
ELKHORN CREEK	TUG FORK		Mar-03							5.6	62.9	MARGINAL
TWIN BRANCH	TUG FORK		Oct-03							5.1	70.0	SUB OPTIMAL
LEADING CREEK	TYGART VALLEY			12	6	77.8	3.8	55.2	15.5		71.5	SUB OPTIMAL
LF FILES CREEK	TYGART VALLEY		Jun-04	14						3.8	77.7	SUB OPTIMAL
LF FILES CREEK	TYGART VALLEY		May-04	10						4.1	66.0	SUB OPTIMAL
LF FILES CREEK	TYGART VALLEY		May-03	12						4.4	68.6	SUB OPTIMAL
LB/LF SANDY CREEJ	TYGART VALLEY	1	Jun-04	8	5	93.9	4.1				73.2	SUB OPTIMAL
LB/LF SANDY CREEJ	TYGART VALLEY	1	Jul-03	12	5		4.7				57.1	MARGINAL
LB/LF SANDY CREEJ	TYGART VALLEY	2	Aug-04	9	5	93.3	4.1	32.8	2.8		78.9	SUB OPTIMAL
LF SANDY CREEK	TYGART VALLEY		Jul-03	7	3	50.0	4.4				54.1	MARGINAL
LF SANDY CREEK	TYGART VALLEY		May-03	10	5		4.7				53.4	MARGINAL
MILLSTONE CREEK	TYGART VALLEY		May-04	9						4.1	63.6	MARGINAL
MILLSTONE CREEK	TYGART VALLEY		May-03				4.4				80.0	OPTIMAL
RB/LF SANDY CREEK	TYGART VALLEY	2	Jun-04	7	4		3.3				53.3	MARGINAL
RB/LF SANDY CREEK	TYGART VALLEY	2	May-03	12	6	64.3	4.2				62.1	SUB OPTIMAL
RB/LF SANDY CREEK	TYGART VALLEY	2	Jul-03	8	4		4.1				51.1	MARGINAL
RB/LF SANDY CREEK	TYGART VALLEY	1	Aug-04	7	3		4.4				45.5	POOR

STREAM	BASIN	STATION	DATE				METRICS				STREAM INDEX	INTEGRITY
OTTE AUVI	B/(OII)	01/11/01	DATE	TOTAL TAXA	EPT TAXA	% EPT	HILSENHOFF	% DOMINANT	% MIDGE	SOS INDEX	OTTEX WITH BEX	INTEGRATI
UNT MIDDLE FORK RIVER	TYGART VALLEY		Jul-04	4	3		3.5				45.0	POOR
BOOTH CREEK	WEST FORK		Jul-03	16	6	52.2	4.8	32.2	3.3		75.9	SUB OPTIMAL
BRUSHY FORK	WEST FORK		Jul-03	11	4	46.2	5.4				55.5	MARGINAL
ELK CREEK	WEST FORK		Mar-04	13	8	41.6	6.1	66.0	1.6		67.0	SUB OPTIMAL
HELENS RUN	WEST FORK		Aug-04	12						5.3	62.1	SUB OPTIMAL
ISAACS CREEK	WEST FORK		Jul-03	15	3	39.6	5.7				57.9	MARGINAL
KINCHELOE CREEK	WEST FORK		Jul-03	14	4	63.2	3.9				70.3	SUB OPTIMAL
LAMBERTS RUN	WEST FORK		Jun-03	3	0	0.0	6.5				27.7	POOR
SALEM FORK	WEST FORK		May-03	15	5	32.9	5.7				53.3	MARGINAL
SKIN CREEK	WEST FORK		Apr-03	14	7	48.6	5.5				59.7	MARGINAL
TENMILE CREEK	WEST FORK		Sep-03	15	6	65.7	5.7				65.4	SUB OPTIMAL
TWO LICK CREEK	WEST FORK		Jul-03	16	6	48.1	4.2				70.7	SUB OPTIMAL
UNT LAMBERTS RUN	WEST FORK		May-03								0.0	POOR
RHINE CREEK	YOUGHIOGHENY		Apr-03	13	8		4.1				72.0	SUB OPTIMAL

Appendix 6. Water level (discharge)

STREAM	BASIN	STATION	DATE		V	/ELOCITY			WEA ⁻	THER
STREAM	DASIN	STATION	DATE	DISCHARGE			HIGH	NO FLOW	CURRENT WEATHER	PAST 48-HOURS
BAKERS RUN	CACAPON	1					Χ			
BAKERS RUN	CACAPON	2				Х				
BAKERS RUN	CACAPON	3				Х				
BAKERS RUN	CACAPON	4	May-04				Χ		LIGHT SHOWERS	HEAVY RAINS
LONG LICK RUN	CACAPON					Х				
LOST RIVER	CACAPON	1				Х				
LOST RIVER	CACAPON	2				Х				
SAUERKRAUT RUN	CACAPON	1					Χ			
SAUERKRAUT RUN	CACAPON	2			Χ					
TROUT RUN	CACAPON	1					Χ			
TROUT RUN	CACAPON	2					Χ			
WAITES RUN	CACAPON						Χ			
BEAVER CREEK	CHEAT	3-1	Aug-03	6.25		Х				
BEAVER CREEK	CHEAT	3-2	Jul-03	6.25		Х				
BEAVER CREEK	CHEAT	3-3	Jul-03	4.98		Х				
BEAVER CREEK	CHEAT	3-5	Aug-03	0.39	Χ					
BEAVER CREEK	CHEAT	3-6	Aug-03	5.65		Х				
BEAVER CREEK	CHEAT	3-7	Aug-03	1.12	Х					
BEAVER CREEK	CHEAT	3-1	May-04	15.10		Х				
BEAVER CREEK	CHEAT	3-5	May-04	39.50			Χ			HEAVY RAINS
BEAVER CREEK	CHEAT	3-10	May-04	8.40		Х				
BEAVER CREEK	CHEAT	3-9	May-04	11.40		Х				
BEAVER CREEK	CHEAT	3-8	May-04	0.56	Χ					
BUFFALO RUN	CHEAT	1-2	Apr-04	8.60		Х				
BUFFALO RUN	CHEAT	1-1	Aug-03	4.70		Х				
BUFFALO RUN	CHEAT	1-2	Aug-03	1.30	Х					
BUFFALO RUN	CHEAT	1-3	Aug-03	3.20		Х				
BUFFALO RUN	CHEAT	1-4	Aug-03	2.10		Х				
BUFFALO RUN	CHEAT	1-5	Aug-03	1.20	Χ					
BUFFALO RUN	CHEAT	1-6	Aug-03	0.93	Χ					
BUFFALO RUN	CHEAT	1-7	Jul-03	0.30	Χ					
BUFFALO RUN	CHEAT		Oct-04	74.20			Χ			
BUFFALO RUN	CHEAT	1-1	May-04	49.60			Χ			THUNDER SHOWERS
BUFFALO RUN	CHEAT	1-3	May-04	35.80			Х			HEAVY RAINS
BUFFALO RUN	CHEAT	1-5	May-04	7.80		Х				SCATTERED SHOWERS
BUFFALO RUN	CHEAT	1-6	May-04	1.50	Х					SCATTERED SHOWERS
BUFFALO RUN	CHEAT	1-7	May-04	3.60		Х				HEAVY RAINS
GLADY FORK	CHEAT		Aug-04			Х				
GLADE RUN	CHEAT	4-1	Jul-03							
GLADE RUN	CHEAT	4-2	Jul-03	1.70	Х					
GLADE RUN	CHEAT	4-3	Jul-03	1.20	Х					

STREAM	BASIN	STATION	DATE		\	/ELOCITY			WEAT	HER
OTTLEAM	BAOIIV	OTATION	DATE	DISCHARGE	LOW	NORMAL	HIGH	NO FLOW	CURRENT WEATHER	PAST 48-HOURS
MUDDY CREEK	CHEAT	1	Jun-03			Х				
MUDDY CREEK	CHEAT	1	Jul-03			Х				
NF GREENS RUN	CHEAT	2-1	Jul-03			Х				
NF GREENS RUN	CHEAT	2-2	Jul-03			Х				
NF GREENS RUN	CHEAT	2-3	Jul-03			Х				
NF GREENS RUN	CHEAT	2-4	Jul-03			Х				
NF GREENS RUN	CHEAT	2-1	May-04	12.70		Х			LIGHT SHOWERS	
NF GREENS RUN	CHEAT	2-2	May-04	7.70		Х				
NF GREENS RUN	CHEAT	2-4	May-04	7.50		Х				SCATTERED SHOWERS
ROARING CREEK	CHEAT	1	Jun-03				Χ			
ROARING CREEK	CHEAT	2	Jul-03				Х		LIGHT SHOWERS	
WATKINS RUN	CHEAT	1	May-03			Х				
WATKINS RUN	CHEAT	2	Aug-03		Х					
WATKINS RUN	CHEAT	2	Aug-04			Х				
CLEAR FORK	COAL		Apr-04				Χ			SCATTERED SHOWERS
BIG SPRING FORK	ELK	1	Jul-04	3.40	Х					
CAMP CREEK	ELK	1	Jun-04	10.80	Х				LIGHT RAINS	
OLD FIELD FORK	ELK	1	Apr-04	20.20		Х				STEADY LIGHT RAINS
ELK RIVER	ELK	1	Oct-03			Х			STEADY LIGHT RAIN	SCATTERED SHOWERS
ELK RIVER	ELK	1	Oct-04	18.20		Х				
ELK RIVER	ELK	2	Aug-04		Х					
ELKLICK RUN	GAULEY		Oct-04			Х			SCATTERED SHOWERS	HEAVY DOWNPOURS
RICH CREEK	GAULEY		Mar-03			Х				
UPPER GLADE RUN	GAULEY	1	Apr-04	3.90		Х				
UPPER GLADE RUN	GAULEY	2	Jun-04			Х			SCATTERED SHOWERS	SCATTERED SHOWERS
UPPER GLADE RUN	GAULEY	3	Jun-03	2.80		Х				SCATTERES SHOWERS
HARTS RUN	GREENBRIER		Feb-04				Χ			LIGHT SNOW
GREENBRIER RIVER	GREENBRIER		Jul-04			Х				
SECOND CREEK	GREENBRIER	1	Jul-04				Χ		HEAVY RAINS	SCATTERED SHOWERS
SECOND CREEK	GREENBRIER	2	Jul-03			Х				
BARKERS CREEK	GUYANDOTTE		May-03				Х		HEAVY AT TIMES	
CABIN CREEK	GUYANDOTTE		Jul-03			Х				
GUYANDOTTE RIVER	GUYANDOTTE		Sep-03		Х					
SLAB FORK	GUYANDOTTE	1	Jul-03			Х				
SLAB FORK	GUYANDOTTE	1	Oct-04			Х			SOME HEAVY RAINS	SCATTERED SHOWERS
ASH BRANCH	KANAWHA		Apr-03				Х		HEAVY RAINS	THUNDER STORMS
FIVEMILE FORK	KANAWHA	1	Jul-03		Х					
FIVEMILE FORK	KANAWHA	2	Jul-03			Х				
FROZEN BRANCH	KANAWHA		Jul-03			Х				
GOOSE HOLLOW	KANAWHA	1	Jul-03		Х					
GOOSE HOLLOW	KANAWHA	2	Jun-04		Х					
HICKS HOLLOW	KANAWHA		Jun-03		Х					

STREAM	BASIN	STATION	DATE		V	/ELOCITY			WEATH	HER
OTTLE/ (IVI	Brioni	017111011	DATE	DISCHARGE	LOW	NORMAL	HIGH	NO FLOW	CURRENT WEATHER	PAST 48-HOURS
HORSEMILL BRANCH	KANAWHA		Jul-03		Χ					
HURRICANE FORK	KANAWHA		Jun-03			Х				
KELLYS CREEK	KANAWHA	1	Jul-03			Х				
KELLYS CREEK	KANAWHA	2	Jul-03			Х				
KELLYS CREEK	KANAWHA	3	Jul-03		Х					
KELLYS CREEK	KANAWHA	4	Jun-03		Х					
KELLYS CREEK	KANAWHA		Jun-03				Χ			
MORRIS CREEK	KANAWHA		Sep-04			Х				HURRICANE FRANCIS RAINS
MORRIS CREEK	KANAWHA	15	Nov-04			Х				
MORRIS CREEK	KANAWHA	7	Nov-04			Х				
MANILA CREEK	KANAWHA	7	Jul-03		Х					
MANILA CREEK	KANAWHA	6	Apr-03		Х					
MANILA CREEK	KANAWHA	5	Apr-03		Х					
MANILA CREEK	KANAWHA	4	Jul-03		Х					
MANILA CREEK	KANAWHA	3	Jul-03		Х					
MANILA CREEK	KANAWHA	2	Jul-03		Х					
MANILA CREEK	KANAWHA	7	Apr-03				Χ			
MANILA CREEK	KANAWHA		Oct-03	7.44		Х			SCATTERED SHOWERS	
POCATALICO RIVER	KANAWHA		May-03			Х			SCATTERED SHOWERS	THUNDER STORMS
TRACE FORK	KANAWHA		Aug-03		Х					
UNT LEFT FORK	KANAWHA		Jul-03			Х				
WILLIS BRANCH	KANAWHA		Jul-03			Х				SCATTERED SHOWERS
CEDAR CREEK	LITTLE KANAWHA		Sep-03	9.85		Х			LIGHT RAIN	SCATTERED SHOWERS
CEDAR CREEK	LITTLE KANAWHA		Apr-03	32.90			Χ		HEAVY RAINS	SCATTERED SHOWERS
ELLIS CREEK	LITTLE KANAWHA		Sep-03	5.80	Х					
LITTLE KANAWHA RIVER	LITTLE KANAWHA		Aug-03			Х				
ABRAMS CREEK	NORTH BRANCH		J		Х					
ELKLICK RUN	NORTH BRANCH					Х				
NF PATTERSON CREEK	NORTH BRANCH	1				Х				
NF PATTERSON CREEK	NORTH BRANCH	2			Х					
PATTERSON CREEK	NORTH BRANCH						Χ			
BRUSH CREEK	NEW	2	Oct-04				Χ		HEAVY DOWNPOURS	
BRUSH CREEK	NEW	1	Apr-03				Χ		SCATTERED SHOWERS	HEAVY DOWNPOURS
DROOPING LICK CREEK	NEW		May-04			Х				
HANS CREEK	NEW		Oct-03			Х				
INDIAN CREEK	NEW		Sep-03				Х		LIGHT SHOWERS	HEAVY RAINS
LAUREL CREEK	NEW		Oct-03	32.90			Х		SHOWERS, HEAVY AT TIMES	LIGHT RAIN
WOLF CREEK	NEW		May-04	19.10			Х		SCATTERED SHOWERS	
LITTLE MILL CREEK	MIDDLE OHIO		May-04			Х			LIGHT SHOWERS, SOME HEAVY	
STEWARTS RUN	MIDDLE OHIO		Jul-04		Х					
UNT HUGHES RIVER	MIDDLE OHIO		Apr-03		Х					
TOMLINSON RUN	UPPER OHIO		Mar-03		Х					

STREAM	BASIN	STATION	DATE		\	/ELOCITY			WEAT	HER
0111271111	5/10/11	OTATION	<i>D</i> , (12	DISCHARGE	LOW	NORMAL	HIGH	NO FLOW	CURRENT WEATHER	PAST 48-HOURS
BACK CREEK	POTOMAC DIRECT	3	Jul-04			Х				
ELK BRANCH	POTOMAC DIRECT		Oct-03				Х			
ELK RUN	POTOMAC DIRECT	1	May-03				Χ			
ELK RUN	POTOMAC DIRECT	2	Oct-03				Χ			
ELK RUN	POTOMAC DIRECT	1	Oct-03				Χ			
HARPER RUN	POTOMAC DIRECT		Jul-03		Х					
HALF MILE RUN	POTOMAC DIRECT		Mar-04			Χ				
KATES RUN	POTOMAC DIRECT		Jun-04			Χ				
OPEQUON CREEK	POTOMAC DIRECT	2	Jul-04			Х		Ì		
RATTLESNAKE RUN	POTOMAC DIRECT	2	Sep-03				Χ			
RATTLESNAKE RUN	POTOMAC DIRECT	1	Apr-03				Χ			
RATTLESNAKE RUN	POTOMAC DIRECT	1	Apr-03				Χ			
ROCKY MARSH RUN	POTOMAC DIRECT	1	Oct-03				Х			
ROCKY MARSH RUN	POTOMAC DIRECT	2	Apr-03				Х			
SLEEPY CREEK	POTOMAC DIRECT	1	May-04				Х			
SLEEPY CREEK	POTOMAC DIRECT	2	Jun-04				Χ			
SLEEPY CREEK	POTOMAC DIRECT	3	Jul-04			Х				
SLEEPY CREEK	POTOMAC DIRECT	3	Nov-03			Х				
SLEEPY CREEK	POTOMAC DIRECT	2	Aug-03		Х				THUNDER STORMS	
SLEEPY CREEK	POTOMAC DIRECT	1	Jul-03			Х				
SLEEPY CREEK	POTOMAC DIRECT		Sep-04		Х					
TOWN RUN	POTOMAC DIRECT		Oct-03			Х				
TUSCARORA CREEK	POTOMAC DIRECT	1	Jul-04				Χ			
TUSCARORA CREEK	POTOMAC DIRECT	2	Apr-04				Χ			HEAVY RAIN
ANDERSON RUN	SOUTH BRANCH					Х				
BIG RUN	SOUTH BRANCH	1	Jun-04		Х				SCATTERED SHOWERS	
BIG RUN	SOUTH BRANCH	2	Aug-04		Х					
BIG RUN	SOUTH BRANCH	1	Apr-04			Х				
CLIFFORD HOLLOW	SOUTH BRANCH						Х			
DUMPLING RUN	SOUTH BRANCH					Х				
FORT RUN	SOUTH BRANCH						Х			
NORTH FORK	SOUTH BRANCH		Oct-04			Х				
SOUTH BRANCH	SOUTH BRANCH		Oct-04			Х				
SOUTH BRANCH	SOUTH BRANCH		Oct-04			Х			SCATTERED SHOWERS	
SOUTH BRANCH	SOUTH BRANCH		Oct-04			Х			LIGHT RAIN	
SOUTH MILL CREEK	SOUTH BRANCH		Jul-03			Х				
SPRING RUN	SOUTH BRANCH	1	Jul-03	40.30			Х			SCATTERED SHOWERS
SPRING RUN	SOUTH BRANCH	2	Jul-03	40.10			Х			SCATTERED SHOWERS
SPRING RUN	SOUTH BRANCH	3	Jul-03				Х			SCATTERED SHOWERS
SPRING RUN	SOUTH BRANCH	4	Jul-03	22.90		Х			STEADY LIGHT RAIN	
SOUTH FORK	SOUTH BRANCH		Oct-04			Х				
TOMBS HOLLOW RUN	SOUTH BRANCH					Х				

STREAM	BASIN	STATION	DATE		V	ELOCITY			WEAT	HER
0111271111	Brioni	017111011	D, (IL	DISCHARGE	LOW	NORMAL	HIGH	NO FLOW	CURRENT WEATHER	PAST 48-HOURS
WALNUT BOTTOM	SOUTH BRANCH	1			Χ					
WALNUT BOTTOM	SOUTH BRANCH	2				Х				
BULLSKIN RUN	SHENANDOAH	1	Nov-03				Χ			
BULLSKIN RUN	SHENANDOAH	2	Oct-03				Χ			
BULLSKIN RUN	SHENANDOAH	3	Nov-03				Χ			
EVITTS RUN	SHENANDOAH	1	May-03				Χ			
EVITTS RUN	SHENANDOAH	1	Oct-03							
EVITTS RUN	SHENANDOAH	2	Oct-03				Χ			
EVITTS RUN	SHENANDOAH	3	Oct-03							
EVITTS RUN	SHENANDOAH	4	Apr-03				Χ			
EVITTS RUN	SHENANDOAH	4	Oct-03				Χ			
HUBBARDS RUN	SHENANDOAH	1	Nov-03				Χ			
HUBBARDS RUN	SHENANDOAH	2	Apr-03			Х				
BRADSHAW CREEK	TUG FORK	2	Mar-03			Х				
BRADSHAW CREEK	TUG FORK	1	Mar-03			Х				
DRY FORK	TUG FORK		Apr-03			Х				
ELKHORN CREEK	TUG FORK		Mar-03				Χ			
TWIN BRANCH	TUG FORK		Oct-03			Х				
LEADING CREEK	TYGART VALLEY						Χ			
LF FILES CREEK	TYGART VALLEY		Jun-04			Х				
LF FILES CREEK	TYGART VALLEY		May-04			Х				
LF FILES CREEK	TYGART VALLEY		May-03			Х				
LB/LF SANDY CREEK	TYGART VALLEY	1	Jun-04			Х				
LB/LF SANDY CREEK	TYGART VALLEY	1	May-03			Х				
LB/LF SANDY CREEK	TYGART VALLEY	2	Aug-04			Х				
LF SANDY CREEK	TYGART VALLEY		Jul-03				Χ			
LF SANDY CREEK	TYGART VALLEY		May-03							
MILLSTONE CREEK	TYGART VALLEY		May-04			Х				
MILLSTONE CREEK	TYGART VALLEY		May-03				Χ		SCATTERED SHOWERS	
RB/LF SANDY CREEK	TYGART VALLEY	2	Jun-04			Х				
RB/LF SANDY CREEK	TYGART VALLEY	2	Jul-03			Х				
RB/LF SANDY CREEK	TYGART VALLEY	2	Jul-03							
RB/LF SANDY CREEK	TYGART VALLEY	1	Aug-04			Х				
UNT MIDDLE FORK RIVER	TYGART VALLEY		Jul-04				Χ		SCATTERED SHOWERS	HEAVY DOWNPOURS
BOOTH CREEK	WEST FORK		Jul-03				Х			HEAVY RAIN
BRUSHY FORK	WEST FORK		Jul-03	15.70			Х			
ELK CREEK	WEST FORK		Mar-04	24.40			Х		SCATTERED SHOWERS	LOCAL HEAVY RAIN
HELENS RUN	WEST FORK		Aug-04		Х					
ISAACS CREEK	WEST FORK		Jul-03	65.40			Х			
KINCHELOE CREEK	WEST FORK		Jul-03	16.30			Х			
SALEM FORK	WEST FORK		May-03		Х					
SKIN CREEK	WEST FORK		Apr-03			Х				

STREAM	BASIN	STATION	DATE		\	/ELOCITY			WEATH	IER
OTTE AW	BAOIN	OTATION	DATE	DISCHARGE	LOW	NORMAL	HIGH	NO FLOW	CURRENT WEATHER	PAST 48-HOURS
TENMILE CREEK	WEST FORK		Sep-03		Χ					
TWO LICK CREEK	WEST FORK		Jul-03	21.90		Х				
UNT LAMBERTS RUN	WEST FORK		May-03		Χ					
RHINE CREEK	YOUGHIOGHENY		Apr-03			Х				
	TOTALS	•	•		46	99	62			

Appendix 7. Land use assessment

STREAM	BASIN	STATION		SUB-URBAN	N, URBAN	& INDUS	TRIAL		RECRE	ATION	AG	SRICUL1	TURE		RESOU	RCE EXTR	ACTION		TRAS	SH		TOTAL	IMPACT
STREAM	BASIN	STATION		SUBURBAN				TRAILS						CONSTRUCTION				ABD MINES			OTHER	TOTAL	IWIFACT
BAKERS RUN	CACAPON	4	2			3	1				2											8	MODERATE
TROUT RUN	CACAPON	1				-					1		2									3	SLIGHT
BEAVER CREEK	CHEAT	3-1				1				1					2							4	MODERATE
BEAVER CREEK	CHEAT	3-2				3														1	3	7	MODERATE
BEAVER CREEK	CHEAT	3-3				2																2	SLIGHT
BEAVER CREEK	CHEAT	3-4	1			1				1	3	1			3		1	1				12	HIGH
BEAVER CREEK	CHEAT	3-5	1			3				1	1				1		2	2				11	HIGH
BEAVER CREEK	CHEAT	3-6	1			1									1		2	2				7	MODERATE
BEAVER CREEK	CHEAT	3-7	1			1									1		1	1			1	6	MODERATE
BEAVER CREEK	CHEAT	3-1				1				1					2							4	MODERATE
BEAVER CREEK	CHEAT	3-5				2												1		2	1	6	MODERATE
BEAVER CREEK	CHEAT	3-10		1		1									1			2			1	6	MODERATE
BEAVER CREEK	CHEAT	3-9		1		1									3						1	6	MODERATE
BEAVER CREEK	CHEAT	3-8		1		1									3			3				8	MODERATE
BUFFALO RUN	CHEAT	1-2	1			1				3												5	MODERATE
BUFFALO RUN	CHEAT	1-1	1			1				2	1			1	1			1				8	HIGH
BUFFALO RUN	CHEAT	1-2	1			2				2	1			1	1			1				9	MODERATE
BUFFALO RUN	CHEAT	1-3	1			2				1	1	1			1			1		1		9	MODERATE
BUFFALO RUN	CHEAT	1-4	3	1		3				1	1	1		3	2			1		1		17	HIGH
BUFFALO RUN	CHEAT	1-5	3			1				1	1			1	2			1		1		11	HIGH
BUFFALO RUN	CHEAT	1-6	1			3				1	1	1		1	1			2				11	HIGH
BUFFALO RUN	CHEAT	1-7	2			3				1	1	1		1	1			1		1		12	HIGH
BUFFALO RUN	CHEAT		2			3				1					1			3				10	MODERATE
BUFFALO RUN	CHEAT	1-1		1		2				3	1				2			1		1		11	HIGH
BUFFALO RUN	CHEAT	1-3		2		2				3	1	1		1	1			3				14	HIGH
BUFFALO RUN	CHEAT	1-5		3		2				2	1	1		1	2			3		1		16	HIGH
BUFFALO RUN	CHEAT	1-6		1		2				3	1	1		1	1			3		1		14	HIGH
BUFFALO RUN	CHEAT	1-7		2		2				3	1	1		1	1			3		1		15	HIGH
GLADY FORK	CHEAT					1				1					1							3	SLIGHT
GLADE RUN	CHEAT	4-1	1								1	2								2		6	MODERATE
GLADE RUN	CHEAT	4-2	1															2		3		6	MODERATE
GLADE RUN	CHEAT	4-3	2															2		2		6	MODERATE
GLADE RUN	CHEAT	4-2	1			1					1	1								2		6	MODERATE
GLADE RUN	CHEAT	4-3		2		1					1	1								3		8	MODERATE
GLADE RUN	CHEAT	4-4		3		1					2									2		8	MODERATE
MUDDY CREEK	CHEAT	1				2	1	1			2				2			1				9	MODERATE
MUDDY CREEK	CHEAT	1				1	1				2				2			2				8	MODERATE
NF GREENS RUN	CHEAT	2-1				1				1		1		1				2				6	MODERATE
NF GREENS RUN	CHEAT	2-2	1	1		1					2	1		1				2				9	HIGH
NF GREENS RUN	CHEAT	2-3	1	1		1				1					1			1				6	MODERATE
NF GREENS RUN	CHEAT	2-4	2	1		1				1	2	1			1			1				10	HIGH

				CUD UDDAN	LUDDAN	. O INDUIG	STRIAL		DECDE	ATION	4.0	DICLILT	TUDE		DECOL	OCE EVIE	MOTION		TDAG	211			1
STREAM	BASIN	STATION		SUB-URBAN					RECRE			RICULT				RCE EXTR			TRAS		071155	TOTAL	IMPACT
	0.5.5		SINGLE		URBAN		BRIDGES ETC	TRAILS	PARKS	OTHER USES	PASTURE	CROP	FEEDLOTS	CONSTRUCTION	LOGGING	OIL/GAS	ACTIVE MINES		LANDFILL	TRASH	OTHER		
NF GREENS RUN	CHEAT	2-1		3		2									2			3				10	MODERATE
NF GREENS RUN	CHEAT	2-2		3		2									2			2				9	MODERATE
NF GREENS RUN	CHEAT	2-4				3	_								3						3	9	MODERATE
ROARING CREEK	CHEAT	1				3	3				1				1							8	MODERATE
ROARING CREEK	CHEAT	2				1	3								1							5	MODERATE
WATKINS RUN	CHEAT	1									1											1	SLIGHT
WATKINS RUN	CHEAT	2									1											1	SLIGHT
CLEAR FORK	COAL		2			2									2			2				8	HIGH
BIG SPRING FORK	ELK	1	2							1	1			1	2							7	MODERATE
CAMP CREEK	ELK	1	1								1	1				1				2		6	MODERATE
OLD FIELD FORK	ELK	1								3	2				2							7	MODERATE
ELK RIVER	ELK	1	1								1			2	2							6	MODERATE
ELK RIVER	ELK	1	1								1	1			2							5	MODERATE
ELKLICK RUN	GAULEY									2					1							3	MODERATE
RICH CREEK	GAULEY		2							1												3	MODERATE
UPPER GLADE RUN	GAULEY	1				3				3					1						2	9	MODERATE
UPPER GLADE RUN	GAULEY	2				3	1			3					1						2	10	HIGH
UPPER GLADE RUN	GAULEY	3				1	3			3					1							8	MODERATE
HARTS RUN	GREENBRIER					3	1		2													6	MODERATE
GREENBRIER RIVER	GREENBRIER		1			1				3	3				1					3		12	HIGH
SECOND CREEK	GREENBRIER	1	1			2			1	1	2	1		1	2							11	HIGH
SECOND CREEK	GREENBRIER	2				2			1	2	2				1							8	MODERATE
BARKERS CREEK	GUYANDOTTE		3			3									2					1		9	HIGH
CABIN CREEK	GUYANDOTTE		2			2		3	2		1	1		1		1		1				14	HIGH
DEVILS FORK	GUYANDOTTE		1							2						1				1		5	MODERATE
SLAB FORK	GUYANDOTTE	1	3				1							2	2	1		2				11	HIGH
SLAB FORK	GUYANDOTTE	1	3			3	1								3			2				12	HIGH
ASH BRANCH	KANAWHA	7	1			1				1					2	1		2		1		9	MODERATE
FIVEMILE FORK	KANAWHA	6				3				1					1	1		3	3	1		13	HIGH
FIVEMILE FORK	KANAWHA	5				2				1					1	1		3	3	1		12	HIGH
FROZEN BRANCH	KANAWHA	4	2											1	1	1		3	3			11	HIGH
GOOSE HOLLOW	KANAWHA	3	2			3									2	2		3	3	1		16	HIGH
GOOSE HOLLOW	KANAWHA	2	2			1					1				1	2		3	3			13	HIGH
HICKS HOLLOW	KANAWHA	1	3			2									1	2		3		2		13	HIGH
HORSEMILL BRANCH	KANAWHA	7	Ť			1				1	1				1	1				1		6	MODERATE
HURRICANE FORK	KANAWHA	1	1			2				1					3	1				i i		8	MODERATE
KELLYS CREEK	KANAWHA		2	2		1	2				2	1			1	1						12	HIGH
KELLYS CREEK	KANAWHA	1	1			2	3	1				<u> </u>		3	1	<u> </u>						11	HIGH
MANILA CREEK	KANAWHA		<u> </u>			3	3	'						,		4		2		1		8	
		†				3									1	1				1			HIGH
MANILA CREEK	KANAWHA	·		<u> </u>			2								1			1				4	MODERATE
POCATALICO RIVER	KANAWHA	15				1				1								1				3	SLIGHT
TRACE FORK	KANAWHA	7	1		<u> </u>	1		<u> </u>	<u> </u>	1	<u> </u>				1	1		3	<u> </u>			8	MODERATE

Part	CTDEAM	DACIN	CTATION		SUB-URBAN	I. URBAN	& INDUS	STRIAL		RECRE	ATION	AG	RICULT	URF		RESOU	RCE EXTR	ACTION		TRAS	SH		TOTAL	IMPACT
Mathematic Mat	STREAM	BASIN	STATION						TRAILS						CONSTRUCTION				ABD MINES			OTHER	TOTAL	IMPACT
Common	WILLIS BRANCH	KANAWHA			00001107111	01107111		DIMBOLO LIO	110 1120	7,4,4,6	OTTILITY GOLD	THOTOTILE	0.10.	1 2232010	CONCINCONON		0.20,10	7.011VE MINIEO	/ IDD IIII (CO	L/ WIDI IEE	1101011	OTTLET	4	MODERATE
Part									1			2				-	2		1					
Marie Mari																1								
Mathematic Mat									·												1			
Machica Mach				1							1		1			2	2		1					
Memory M											1				2	_	_							
March No. Marc								2			2	1							_					
NAME OFFICE AND OFFICE OF ANY OF 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0			2	1								1												
MARIS CRIFTIC MARIS CRIFTI						1					3										1			
Maria Career Mari				2				-				1				1					1			
NOVERNER NEWN 15 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1												3	3	1	1									
Part				1			2		1		1	2			1	1							11	
STEAMATIS RUN MEDICLE CHILD MEDICLE SPUNCE								2				2				2					1	2	11	
NATINGHES RUER MOCICIENTO UPPER OND UPPER																	2							
NOLINGON RINA UPSER OMNO POTIMAL DRINGT 3 2 3 2 3 3 4 5 4 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5							2	1							3									
SECTION RECORD R				1				2	2		2	1												
ELKRIN POTOMAC DIRECT	BACK CREEK		3	2				2				2	2		3								11	
MARCHERIN POTOMAC DIRECT 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1			1				1			1	1	1	1									1	7	
NALE RINE MERINE POTOMAC DIRECT 1 2 1 1 2 2 1 2 1 2 2 1 3 2 2 1 1 1 1 2 2 1 1 1 1		POTOMAC DIRECT		1					3		3	1			3								11	
ATES RUN POTOMAC DIRECT POTOMAC DIRE	HALF MILE RUN			2												2					2		6	
POPE																				3				
POPE		POTOMAC DIRECT	2	1	2	2	1					3	1										10	
RATTLESNAKE RUN POTOMAC DIRECT 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		POTOMAC DIRECT	1	2	3			3				3			1								12	HIGH
RATTLESMARE RUN POTOMAC DIRECT 1 1 2 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		POTOMAC DIRECT	2	1	1		2					1	1										6	MODERATE
SLEEPY CREEK POTOMAC DIRECT 2 2 2 1 0 3 0 1 0 0 1 0 1 0 1 0 1 0 1 0 1 0 1		POTOMAC DIRECT	1	1	1		1				2	1											6	MODERATE
SLEEPY CREEK POTOMAC DIRECT 3	SLEEPY CREEK	POTOMAC DIRECT	1	2	1		1					1	1										6	MODERATE
SLEEPY CREEK POTOMAC DIRECT 1 2 2	SLEEPY CREEK	POTOMAC DIRECT	2	2	1		3				2					2							10	HIGH
SLEEPY CREEK POTOMAC DIRECT 1 2	SLEEPY CREEK	POTOMAC DIRECT	3	1							1					1							3	SLIGHT
SLEPY CREEK POTOMAC DIRECT	SLEEPY CREEK	POTOMAC DIRECT	3	2	2				1						1								6	MODERATE
TUSCARORA CREEK POTOMAC DIRECT 1 2 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3	SLEEPY CREEK	POTOMAC DIRECT	1	2								1	1		2								6	MODERATE
TUSCARORA CREEK POTOMAC DIRECT 2 2 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3	SLEEPY CREEK	POTOMAC DIRECT		2			1					1	1										5	MODERATE
ANDERSON RUN SOUTH BRANCH BIG RUN SOUTH BRANCH 1 1 2 1 2 1 1 2 1 1 2 1 1	TUSCARORA CREEK	POTOMAC DIRECT	1	2			1				3	2	2										10	HIGH
BIG RUN SOUTH BRANCH 1 1 2 1 1 2 1 1 3 SLIGHT BIG RUN SOUTH BRANCH 2 1 1 1 1 1 1 3 SLIGHT BIG RUN SOUTH BRANCH 1 2 1 2 3 SLIGHT FORT RUN SOUTH BRANCH 2 1 4 2 1 1 4 3 SLIGHT NORTH FORK SOUTH BRANCH 2 1 4 2 1 1 1 2 4 1 0 MODERATE SOUTH BRANCH 2 1 3 2 3 2 2 1 13 HIGH SOUTH BRANCH 2 2 1 1 2 2 1 1 3 2 3 2 1 1 13 HIGH SOUTH BRANCH 2 2 1 1 2 2 1 <td>TUSCARORA CREEK</td> <td>POTOMAC DIRECT</td> <td>2</td> <td>2</td> <td>3</td> <td></td> <td>3</td> <td>3</td> <td></td> <td></td> <td>3</td> <td>1</td> <td></td> <td></td> <td>3</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>18</td> <td>HIGH</td>	TUSCARORA CREEK	POTOMAC DIRECT	2	2	3		3	3			3	1			3								18	HIGH
BIG RUN SOUTH BRANCH 2 1 1 1 1 1 1 3 SLIGHT BIG RUN SOUTH BRANCH 1 1 2 3 SLIGHT FORT RUN SOUTH BRANCH 3 3 SLIGHT NORTH FORK SOUTH BRANCH 2 1 2 1 1 1 2 1 1 0 MODERATE SOUTH BRANCH 2 1 3 2 3 2 3 2 1 1 13 HIGH SOUTH BRANCH 2 2 1 1 2 1 1 2 1 1 1 3 1 2 1 13 HIGH	ANDERSON RUN	SOUTH BRANCH										3											3	SLIGHT
BIG RUN SOUTH BRANCH 1 1 2 3 SLIGHT FORT RUN SOUTH BRANCH 2 1 2 1 1 2 1 3 SLIGHT NORTH FORK SOUTH BRANCH 2 1 2 1 1 1 2 1 1 0 1 0	BIG RUN	SOUTH BRANCH	1						1		2												3	SLIGHT
FORT RUN SOUTH BRANCH 2 1 2 1 1 2 1 3 3 SLIGHT NORTH FORK SOUTH BRANCH 2 1 2 1 1 1 2 1 1 1 1 1 2 1 <td>BIG RUN</td> <td>SOUTH BRANCH</td> <td>2</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>1</td> <td></td> <td></td> <td>1</td> <td></td> <td></td> <td></td> <td>1</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>3</td> <td>SLIGHT</td>	BIG RUN	SOUTH BRANCH	2						1			1				1							3	SLIGHT
NORTH FORK SOUTH BRANCH 2 1 2 1 1 1 1 2 1 10 MODERATE SOUTH BRANCH SOUTH BRANCH 2 1 3 2 3 2 3 2 3 1 <			1						1			2											3	
NORTH FORK SOUTH BRANCH 2 1 2 1 1 1 1 2 1 10 MODERATE SOUTH BRANCH SOUTH BRANCH 2 1 3 2 3 2 3 2 3 1 <																					3		3	
SOUTH BRANCH 2 2 1 2 1 1 2 1 1 2 1 1 3 HIGH	NORTH FORK	SOUTH BRANCH		2			1				2	1	1		1	2							10	MODERATE
SOUTH BRANCH 2 2 1 2 1 1 2 1 1 2 1 1 3 HIGH	SOUTH BRANCH						1				3	2	3			2							13	
	SOUTH BRANCH			2			2				1	2	2	1	1	2								
SOUTH BRANCH SOUTH BRANCH 2 2 3 2 2 2	SOUTH BRANCH	SOUTH BRANCH		2	<u> </u>		2				3	2	2			2							13	HIGH

				OUR LIDDAN	LUDDAN	I A INDUI	TDIAL		DEODE	ATION		2010111	TUDE.		DECOU	OF EVER	AOTION		TDAG	211			
STREAM	BASIN	STATION		SUB-URBAN					RECRE			GRICUL				RCE EXTR			TRAS		071150	TOTAL	IMPACT
0007011000 000504			SINGLE	SUBURBAN	URBAN		BRIDGES ETC	TRAILS	PARKS	OTHER USES				CONSTRUCTION	LOGGING	OIL/GAS	ACTIVE MINES	ABD MINES	LANDFILL	TRASH	OTHER		
SOUTH MILL CREEK	SOUTH BRANCH					2					3	1	1									7	MODERATE
SPRING RUN	SOUTH BRANCH	1	1			1		1			1		3									7	MODERATE
SPRING RUN	SOUTH BRANCH	2	2			1					1		3									7	MODERATE
SPRING RUN	SOUTH BRANCH	3	2			1					1		3									7	MODERATE
SPRING RUN	SOUTH BRANCH	4						1			1											2	SLIGHT
SOUTH FORK	SOUTH BRANCH		1			1	2			1	3	2			2							12	HIGH
WALNUT BOTTOM	SOUTH BRANCH	1				Ì					3											3	SLIGHT
EVITTS RUN	SHENANDOAH	4	1	2		2					1											6	MODERATE
HUBBARDS RUN	SHENANDOAH	2	2	1		1					1			2								7	MODERATE
BRADSHAW CREEK	TUG FORK	2	3			3								1	2	2				Ì		11	HIGH
BRADSHAW CREEK	TUG FORK	1	3			3									3	3						12	HIGH
DRY FORK	TUG FORK		3			3				2	1				2	2						13	HIGH
TWIN BRANCH	TUG FORK		1			1	1		2			1			1							5	MODERATE
LF FILES CREEK	TYGART VALLEY					1		1				1			1							3	MODERATE
LF FILES CREEK	TYGART VALLEY					1		2							2							5	MODERATE
LF FILES CREEK	TYGART VALLEY					1				1					2							4	MODERATE
LB/LF SANDY CREEJ	TYGART VALLEY	1									1							3				4	SLIGHT
LB/LF SANDY CREEJ	TYGART VALLEY	1				2					1							3				6	MODERATE
LB/LF SANDY CREEJ	TYGART VALLEY	2				1												3				4	SLIGHT
LF SANDY CREEK	TYGART VALLEY										2	1						3				6	MODERATE
LF SANDY CREEK	TYGART VALLEY		1			1					2	2						3				9	MODERATE
MILLSTONE CREEK	TYGART VALLEY							1	1						2							4	SLIGHT
MILLSTONE CREEK	TYGART VALLEY								1	1					2							4	MODERATE
RB/LF SANDY CREEK	TYGART VALLEY	2									2							3				5	MODERATE
RB/LF SANDY CREEK	TYGART VALLEY	2	1								2	1						2				6	MODERATE
RB/LF SANDY CREEK	TYGART VALLEY	2				1	1				1							3				6	MODERATE
RB/LF SANDY CREEK	TYGART VALLEY	1				1												3				4	SLIGHT
UNT MIDDLE FORK RIVER	TYGART VALLEY									3								3				6	MODERATE
BOOTH CREEK	WEST FORK		2			2	3							1				2				10	HIGH
BRUSHY FORK	WEST FORK		2			1												3				6	MODERATE
ELK CREEK	WEST FORK		1			1					2							2				6	MODERATE
HELENS RUN	WEST FORK		3			3					_				3			_			3	12	HIGH
ISAACS CREEK	WEST FORK		3			3					2	2									ŭ	10	HIGH
KINCHELOE CREEK	WEST FORK		3			2					2	Ĺ				2		1				10	HIGH
LAMBERTS RUN	WEST FORK		1			3						1		1		1		3		2		11	High
SALEM FORK	WEST FORK WEST FORK		1			3	3				2					'		3				9	MODERATE
			<u> </u>				3			4		_			•	4							
SKIN CREEK	WEST FORK		_			1				1	3	2			2	1						10	HIGH
TENMILE CREEK	WEST FORK		1			2					3	1				1		1				9	MODERATE
TWO LICK CREEK	WEST FORK		3			2		-			2	1				2						9	MODERATE
UNT LAMBERTS RUN	WEST FORK		1			3						1						3				7	HIGH
RHINE CREEK	YOUGHIOGHENY		1	<u> </u>	2.4		J	2	0.	7	1	1.2	<u> </u>			2.0		<u> </u>		0.5	L	6	SLIGHT MODERATE
		L			2.4				0.	•		1.2				2.0				0.5		٠	MODERATE

Appendix 8. Riffle composition

STREAM	BASIN	STATION	DATE				COMPOSITION				INDEX	INTEGRITY
OTTLEAM	BAOIIV	OTATION	DATE	SILT/CLAY	SAND	FINE GRAVEL	COARSE GRAVEL	COBBLE	BOULDER	BEDROCK	IIVDEX	INTEGRATI
BAKERS RUN	CACAPON	1				20.0	20.0	50.0	10.0		80.0	SUB OPTIMAL
BAKERS RUN	CACAPON	2		5.0	20.0	15.0	15.0	30.0	15.0		61.3	MARGINAL
BAKERS RUN	CACAPON	3			20.0		40.0	30.0	10.0		70.0	SUB OPTIMAL
LONG LICK RUN	CACAPON			5.0	10.0	20.0	20.0	15.0	30.0		57.5	MARGINAL
LOST RIVER	CACAPON	1			10.0	40.0	10.0	10.0	30.0		55.0	MARGINAL
LOST RIVER	CACAPON	2			10.0		10.0	50.0	30.0		75.0	SUB OPTIMAL
SAUERKRAUT RUN	CACAPON	1			30.0	10.0	10.0	20.0	25.0	5.0	53.8	MARGINAL
SAUERKRAUT RUN	CACAPON	2			20.0		20.0	30.0	35.0	5.0	68.8	SUB OPTIMAL
TROUT RUN	CACAPON	1			20.0		20.0	10.0	10.0	40.0	45.0	POOR
TROUT RUN	CACAPON	2			20.0	10.0	20.0	10.0	20.0	20.0	50.0	MARGINAL
WAITES RUN	CACAPON			5.0	5.0		10.0	70.0	10.0		83.8	OPTIMAL
BEAVER CREEK	CHEAT	3-1	Aug-03	5.0	30.0		10.0	30.0	15.0	10.0	55.0	MARGINAL
BEAVER CREEK	CHEAT	3-2	Jul-03		25.0		15.0	20.0	20.0	20.0	52.5	MARGINAL
BEAVER CREEK	CHEAT	3-3	Jul-03		15.0		15.0	15.0	30.0	15.0	48.8	POOR
BEAVER CREEK	CHEAT	3-4	Aug-03	30.0	35.0		10.0	15.0	10.0		36.3	POOR
BEAVER CREEK	CHEAT	3-5	Aug-03	15.0	15.0		30.0	30.0	10.0		61.3	MARGINAL
BEAVER CREEK	CHEAT	3-6	Aug-03	2.0	18.0		5.0	65.0	10.0		78.3	SUB OPTIMAL
BEAVER CREEK	CHEAT	3-7	Aug-03	20.0	25.0		10.0	15.0	30.0		43.8	POOR
BEAVER CREEK	CHEAT	3-1	May-04	10.0	5.0		10.0	25.0	25.0	25.0	52.5	MARGINAL
BEAVER CREEK	CHEAT	3-5	May-04		25.0		5.0	50.0	10.0	10.0	67.5	SUB OPTIMAL
BEAVER CREEK	CHEAT	3-9	May-04		10.0	15.0	30.0	30.0	10.0	5.0	68.8	SUB OPTIMAL
BEAVER CREEK	CHEAT	3-8	May-04	5.0	15.0		10.0	20.0	25.0	25.0	50.0	MARGINAL
BUFFALO RUN	CHEAT	1-2	Apr-04		8.0		20.0	62.0	10.0		84.0	OPTIMAL
BUFFALO RUN	CHEAT	1-1	Aug-03		7.0		7.0	86.0			93.0	OPTIMAL
BUFFALO RUN	CHEAT	1-2	Aug-03		10.0	10.0	10.0	30.0	40.0		65.0	SUB OPTIMAL
BUFFALO RUN	CHEAT	1-3	Aug-03		10.0		20.0	40.0	30.0		72.5	SUB OPTIMAL
BUFFALO RUN	CHEAT	1-4	Aug-03		5.0		15.0	20.0	20.0	40.0	52.5	MARGINAL
BUFFALO RUN	CHEAT	1-5	Aug-03		20.0	10.0	30.0	30.0	10.0		67.5	SUB OPTIMAL
BUFFALO RUN	CHEAT	1-6	Aug-03		10.0	10.0	20.0	45.0	15.0		75.0	SUB OPTIMAL
BUFFALO RUN	CHEAT	1-7	Jul-03		10.0		20.0	50.0	15.0	5.0	76.3	SUB OPTIMAL
BUFFALO RUN	CHEAT		Oct-04	20.0	25.0		10.0	30.0	10.0	5.0	50.0	MARGINAL
BUFFALO RUN	CHEAT	1-1	May-04				50.0	50.0			87.5	OPTIMAL
BUFFALO RUN	CHEAT	1-3	May-04				60.0	40.0			85.0	OPTIMAL
BUFFALO RUN	CHEAT	1-5	May-04				80.0	20.0			80.0	OPTIMAL
BUFFALO RUN	CHEAT	1-6	May-04				10.0	10.0	20.0	60.0	42.5	POOR
BUFFALO RUN	CHEAT	1-7	May-04				10.0	80.0	10.0		92.5	OPTIMAL
GLADY FORK	CHEAT		Aug-04		12.0		30.0	53.0	5.0		81.0	OPTIMAL
GLADE RUN	CHEAT	4-1	Jul-03	25.0	25.0		30.0	10.0	10.0		43.8	POOR
GLADE RUN	CHEAT	4-2	Jul-03	62.0	3.0		15.0	10.0	5.0	5.0	25.8	POOR
GLADE RUN	CHEAT	4-3	Jul-03	15.0	20.0	30.0	20.0	10.0	5.0		47.5	POOR
GLADE RUN	CHEAT	4-2	May-04	10.0	20.0		30.0	30.0	10.0		62.5	MARGINAL

STREAM	BASIN	STATION	DATE				COMPOSITION				INDEX	INTEGRITY
OTTEAW	BAOIN	OTATION	DATE	SILT/CLAY	SAND	FINE GRAVEL	COARSE GRAVEL	COBBLE	BOULDER	BEDROCK	INDEX	INTEGRATI
GLADE RUN	CHEAT	4-3	May-04	20.0	20.0		40.0	15.0	5.0		52.5	MARGINAL
GLADE RUN	CHEAT	4-4	May-04				10.0	80.0	10.0		92.5	OPTIMAL
MUDDY CREEK	CHEAT	1	Jun-03		10.0		10.0	40.0	40.0		70.0	SUB OPTIMAL
MUDDY CREEK	CHEAT	1	Jul-03		10.0	10.0	30.0	30.0	20.0		70.0	SUB OPTIMAL
NF GREENS RUN	CHEAT	2-1	Jul-03		10.0		10.0	40.0	40.0		70.0	SUB OPTIMAL
NF GREENS RUN	CHEAT	2-2	Jul-03		10.0	10.0	10.0	40.0	30.0		70.0	SUB OPTIMAL
NF GREENS RUN	CHEAT	2-3	Jul-03		10.0		20.0	20.0	30.0	20.0	57.5	MARGINAL
NF GREENS RUN	CHEAT	2-4	Jul-03		20.0		10.0	30.0	40.0		62.5	MARGINAL
NF GREENS RUN	CHEAT	2-1	May-04		5.0		10.0	50.0	35.0		76.3	SUB OPTIMAL
NF GREENS RUN	CHEAT	2-2	May-04	10.0	20.0		25.0	25.0	20.0		58.8	SUB OPTIMAL
NF GREENS RUN	CHEAT	2-4	May-04		75.0		10.0	10.0	5.0		38.8	POOR
ROARING CREEK	CHEAT	1	Jun-03		10.0	10.0	20.0	20.0	40.0		62.5	MARGINAL
ROARING CREEK	CHEAT	2	Jul-03		15.0	10.0	35.0	35.0	5.0		72.5	SUB OPTIMAL
WATKINS RUN	CHEAT	1	May-03		5.0		25.0	65.0	5.0		87.5	OPTIMAL
WATKINS RUN	CHEAT	2	Aug-04		5.0		20.0	75.0			91.3	OPTIMAL
CLEAR FORK	COAL		Apr-04		5.0		30.0	60.0	5.0		86.3	OPTIMAL
BIG SPRING FORK	ELK	1	Jul-04				56.0	36.0	4.0		80.0	SUB OPTIMAL
CAMP CREEK	ELK	1	Jun-04		17.8		31.7	20.8	4.0		51.0	MARGINAL
OLD FIELD FORK	ELK	1	Apr-04		10.8		2.7	29.7	32.4		50.6	MARGINAL
ELK RIVER	ELK	1	Oct-03		8.0	12.0		78.0			86.0	OPTIMAL
ELK RIVER	ELK	1	Oct-04		0.7	2.7	13.5	64.3	16.2	2.7	84.7	OPTIMAL
ELK RIVER	ELK	2	Aug-04		5.0		35.0	50.0	10.0		82.5	OPTIMAL
ELKLICK RUN	GAULEY		Oct-04		5.0		20.0	60.0	15.0		83.8	OPTIMAL
RICH CREEK	GAULEY		Mar-03		8.0		60.0	30.0	2.0		78.0	SUB OPTIMAL
UPPER GLADE RUN	GAULEY	1	Apr-04	3.5	8.9		40.0	35.7	7.8	4.3	72.9	SUB OPTIMAL
UPPER GLADE RUN	GAULEY	2	Jun-04		25.0		35.0	40.0			72.5	SUB OPTIMAL
UPPER GLADE RUN	GAULEY	3	Jun-03		5.0	20.0	15.0	35.0	25.0		70.0	SUB OPTIMAL
HARTS RUN	GREENBRIER		Feb-04		3.0		37.0	60.0			88.5	OPTIMAL
GREENBRIER RIVER	GREENBRIER		Jul-04	3.0	9.0		30.0	43.0	15.0		75.3	SUB OPTIMAL
SECOND CREEK	GREENBRIER	1	Jul-04	2.0	5.0		15.0	48.0	10.0	20.0	70.5	SUB OPTIMAL
SECOND CREEK	GREENBRIER	2	Jul-03		5.0	20.0	40.0	30.0	5.0		73.8	SUB OPTIMAL
BARKERS CREEK	GUYANDOTTE		May-03	5.0	10.0		45.0	40.0			76.3	SUB OPTIMAL
CABIN CREEK	GUYANDOTTE		Jul-03	5.0	5.0		15.0	35.0	40.0		67.5	SUB OPTIMAL
DEVILS FORK	GUYANDOTTE		Jul-03	5.0	5.0	5.0	25.0	60.0			82.5	OPTIMAL
GUYANDOTTE RIVER	GUYANDOTTE		Sep-03		30.0		10.0	45.0	15.0		67.5	SUB OPTIMAL
SLAB FORK	GUYANDOTTE	1	Jul-03	5.0	15.0		35.0	25.0	20.0		65.0	SUB OPTIMAL
SLAB FORK	GUYANDOTTE	1	Oct-04		1.0		50.0	49.0			86.8	OPTIMAL
ASH BRANCH	KANAWHA		Apr-03	5.0	20.0		30.0	40.0	5.0		70.0	SUB OPTIMAL
HORSEMILL BRANCH	KANAWHA		Jul-03		30.0	10.0	30.0	10.0	20.0		55.0	MARGINAL
HURRICANE FORK	KANAWHA		Jun-03		20.0		40.0	20.0	20.0		65.0	SUB OPTIMAL
MORRIS CREEK	KANAWHA		Sep-04		5.0	25.0	40.0	20.0	10.0		68.8	SUB OPTIMAL
MORRIS CREEK	KANAWHA	15	Nov-04	5.0	15.0		10.0	60.0	10.0		76.3	SUB OPTIMAL

STREAM	BASIN	STATION	DATE				COMPOSITION				INDEX	INTEGRITY
OTILAWI	BASIN	STATION	D	SILT/CLAY	SAND	FINE GRAVEL	COARSE GRAVEL	COBBLE	BOULDER	BEDROCK	INDEX	INTEGRATI
MORRIS CREEK	KANAWHA	7	Nov-04		5.0		25.0	65.0	5.0		87.5	OPTIMAL
MANILA CREEK	KANAWHA	7	Jul-03	1.0	10.0	10.0	25.0	45.0	9.0		75.8	SUB OPTIMAL
MANILA CREEK	KANAWHA	6	Apr-03	1.4	3.4		27.2	54.4	13.6		82.5	OPTIMAL
MANILA CREEK	KANAWHA	5	Apr-03	1.9	12.9	20.0	34.8	25.8	4.5		67.4	SUB OPTIMAL
MANILA CREEK	KANAWHA	4	Jul-03	1.0	4.8	14.4	20.0	37.7	1.0		61.6	MARGINAL
MANILA CREEK	KANAWHA	3	Jul-03	2.0	5.0	20.0	50.0	21.0	2.0		70.8	SUB OPTIMAL
MANILA CREEK	KANAWHA	2	Jul-03	2.0	6.0		40.0	40.0	12.0		77.5	SUB OPTIMAL
MANILA CREEK	KANAWHA	1	Jul-03	2.0	20.0		30.0	45.0	3.0		74.0	SUB OPTIMAL
MANILA CREEK	KANAWHA	7	Apr-03	1.0	10.0		35.0	45.0	9.0		78.3	SUB OPTIMAL
MANILA CREEK	KANAWHA		Oct-03		18.0	20.0	25.0	30.0	7.0		66.8	SUB OPTIMAL
TRACE FORK	KANAWHA		Aug-03	10.0	5.0	30.0	10.0	30.0	15.0		61.3	MARGINAL
WILLIS BRANCH	KANAWHA		Jul-03		10.0	10.0	35.0	45.0			78.8	SUB OPTIMAL
CEDAR CREEK	LITTLE KANAWHA		Sep-03	5.0	15.0		45.0	25.0	10.0		67.5	SUB OPTIMAL
CEDAR CREEK	LITTLE KANAWHA		Apr-03	10.0	20.0	30.0	20.0	10.0	10.0		50.0	MARGINAL
ELLIS CREEK	LITTLE KANAWHA		Sep-03		35.0		60.0	5.0			58.8	MARGINAL
LITTLE KANAWHA RIVER	LITTLE KANAWHA		Aug-03	40.0	20.0		30.0	10.0			37.5	POOR
ABRAMS CREEK	NORTH BRANCH		,	10.0	60.0		10.0	20.0			42.5	POOR
ELKLICK RUN	NORTH BRANCH			30.0	5.0		30.0	30.0	5.0		56.3	MARGINAL
NF PATTERSON CREEK	NORTH BRANCH	1			10.0		38.0	35.0	10.0	10.0	73.5	SUB OPTIMAL
NF PATTERSON CREEK	NORTH BRANCH	2					80.0	20.0			80.0	SUB OPTIMAL
PATTERSON CREEK	NORTH BRANCH						10.0	20.0	10.0	60.0	47.5	POOR
BRUSH CREEK	NEW	2	Oct-04		5.0		5.0	10.0	75.0		52.5	MARGINAL
BRUSH CREEK	NEW	1	Apr-03		5.0		5.0	80.0	10.0		90.0	OPTIMAL
DROOPING LICK CREEK	NEW		May-04	3.0	15.0	3.0	30.0	40.0	2.0	7.0	70.5	SUB OPTIMAL
HANS CREEK	NEW		Oct-03	5.0	25.0		30.0	40.0			68.8	SUB OPTIMAL
INDIAN CREEK	NEW		Sep-03	5.0	25.0		45.0	25.0			65.0	SUB OPTIMAL
LAUREL CREEK	NEW		Oct-03		30.0		10.0	40.0	20.0		65.0	SUB OPTIMAL
WOLF CREEK	NEW		May-03		5.0	10.0		55.0	30.0		76.3	SUB OPTIMAL
STEWARTS RUN	MIDDLE OHIO		Jul-04		20.0		30.0	30.0		20.0	62.5	MARGINAL
UNT HUGHES RIVER	MIDDLE OHIO		Apr-03		5.0	10.0	25.0	50.0	10.0		80.0	OPTIMAL
TOMLINSON RUN	UPPER OHIO		Mar-03	10.0	10.0		40.0	30.0	10.0		67.5	SUB OPTIMAL
BACK CREEK	POTOMAC DIRECT	3	Jul-04	20.0	15.0		60.0	5.0			53.8	MARGINAL
HARPER RUN	POTOMAC DIRECT		Jul-03	40.0	10.0	20.0		20.0			32.5	POOR
HALF MILE RUN	POTOMAC DIRECT		Mar-04	30.0	35.0		10.0	20.0	5.0		38.8	POOR
KATES RUN	POTOMAC DIRECT		Jun-04	10.0			25.0	40.0	20.0	5.0	70.0	SUB OPTIMAL
OPEQUON CREEK	POTOMAC DIRECT	2	Jul-04	10.0	40.0	30.0	20.0				40.0	POOR
OPEQUON CREEK	POTOMAC DIRECT	1	Oct-03		70.0		30.0				40.0	POOR
RATTLESNAKE RUN	POTOMAC DIRECT	1	Apr-03	6.0	28.0		6.0	60.0			71.5	SUB OPTIMAL
SLEEPY CREEK	POTOMAC DIRECT	1	May-04	5.0	15.0		25.0	50.0	5.0		75.0	SUB OPTIMAL
SLEEPY CREEK	POTOMAC DIRECT	2	Jun-04		4.0		1.0	15.0	80.0		56.8	MARGINAL
SLEEPY CREEK	POTOMAC DIRECT	3	Nov-03		5.0		35.0	55.0	5.0		85.0	OPTIMAL
SLEEPY CREEK	POTOMAC DIRECT	2	Aug-03				5.0	15.0	80.0		58.8	SUB OPTIMAL

STREAM	BASIN	STATION	DATE				COMPOSITION				INDEX	INTEGRITY
OTTLE AND	BACILL	017111011	Ditte	SILT/CLAY	SAND	FINE GRAVEL	COARSE GRAVEL	COBBLE	BOULDER	BEDROCK	IIIDEX	IIVIEORITI
SLEEPY CREEK	POTOMAC DIRECT	1	Jul-03		20.0	10.0		60.0	10.0		75.0	SUB OPTIMAL
SLEEPY CREEK	POTOMAC DIRECT		Sep-04		10.0	20.0	60.0	10.0			67.5	SUB OPTIMAL
TUSCARORA CREEK	POTOMAC DIRECT	1	Jul-04	10.0	10.0	5.0	10.0	60.0	5.0		75.0	SUB OPTIMAL
TUSCARORA CREEK	POTOMAC DIRECT	2	Apr-04	10.0	20.0		10.0		60.0		42.5	POOR
ANDERSON RUN	SOUTH BRANCH			20.0			80.0				60.0	MARGINAL
BIG RUN	SOUTH BRANCH	1	Jun-04		5.0		30.0	50.0	15.0		81.3	OPTIMAL
BIG RUN	SOUTH BRANCH	2	Aug-04		10.0		30.0	40.0	20.0		75.0	SUB OPTIMAL
BIG RUN	SOUTH BRANCH	1	Apr-04		15.0		30.0	50.0	5.0		78.8	SUB OPTIMAL
CLIFFORD HOLLOW	SOUTH BRANCH			10.0	30.0		20.0	20.0	20.0		52.5	MARGINAL
DUMPLING RUN	SOUTH BRANCH					5.0	5.0	80.0	10.0		91.3	OPTIMAL
FORT RUN	SOUTH BRANCH						5.0	70.0	10.0	5.0	80.0	OPTIMAL
NORTH FORK	SOUTH BRANCH		Oct-04		10.0		8.0	70.0	12.0		84.5	OPTIMAL
SOUTH BRANCH	SOUTH BRANCH		Oct-04				10.0	80.0	10.0		92.5	OPTIMAL
SOUTH BRANCH	SOUTH BRANCH		Oct-04		5.0		5.0	90.0			95.0	OPTIMAL
SOUTH BRANCH	SOUTH BRANCH		Oct-04		15.0		35.0	45.0	5.0		77.5	SUB OPTIMAL
SPRING RUN	SOUTH BRANCH	1	Jul-03		14.7		52.6	25.6	2.1	5.2	71.1	SUB OPTIMAL
SPRING RUN	SOUTH BRANCH	2	Jul-03		9.2		60.3	14.7	11.4	4.3	69.0	SUB OPTIMAL
SPRING RUN	SOUTH BRANCH	3	Jul-03		10.0		30.0	40.0	10.0		70.0	SUB OPTIMAL
SPRING RUN	SOUTH BRANCH	4	Jul-03		10.0		45.0	35.0	10.0		76.3	SUB OPTIMAL
SOUTH FORK	SOUTH BRANCH		Oct-04				10.0	75.0	3.0	12.0	87.0	OPTIMAL
TOMBS HOLLOW RUN	SOUTH BRANCH			5.0	40.0	25.0	20.0	10.0	5.0		50.0	MARGINAL
WALNUT BOTTOM	SOUTH BRANCH	1		20.0		5.0	5.0	30.0	40.0		56.3	MARGINAL
WALNUT BOTTOM	SOUTH BRANCH	2			10.0	5.0	5.0	5.0		70.0	31.3	POOR
EVITTS RUN	SHENANDOAH	4	Apr-03	5.0	10.0	20.0	10.0	45.0	10.0		70.0	SUB OPTIMAL
HUBBARDS RUN	SHENANDOAH	2	Apr-03	25.0	20.0		25.0	5.0			28.8	MARGINAL
BRADSHAW CREEK	TUG FORK	2	Mar-03	2.0	2.0		10.0	40.0	46.0		71.0	SUB OPTIMAL
BRADSHAW CREEK	TUG FORK	1	Mar-03		5.0		70.0	15.0	10.0		73.8	SUB OPTIMAL
DRY FORK	TUG FORK		Apr-03	2.0	20.0		5.0	56.0	10.0		69.8	SUB OPTIMAL
ELKHORN CREEK	TUG FORK		Mar-03	2.0	8.0		15.0	75.0			88.3	OPTIMAL
TWIN BRANCH	TUG FORK		Oct-03		20.0	1.0	59.0	20.0			69.8	SUB OPTIMAL
LEADING CREEK	TYGART VALLEY			10.0			10.0	60.0	10.0	10.0	75.0	SUB OPTIMAL
LF FILES CREEK	TYGART VALLEY		Jun-04		5.0		35.0	45.0	15.0		80.0	SUB OPTIMAL
LB/LF SANDY CREEK	TYGART VALLEY	1	Jun-04		5.0	10.0	10.0	70.0	5.0		86.3	OPTIMAL
LB/LF SANDY CREEK	TYGART VALLEY	1	Jul-03		5.0		20.0	55.0	15.0		78.8	SUB OPTIMAL
LB/LF SANDY CREEK	TYGART VALLEY	2	Aug-04		5.0		20.0	70.0	5.0		88.8	OPTIMAL
LF SANDY CREEK	TYGART VALLEY		Jul-03		5.0		20.0	70.0	5.0		88.8	OPTIMAL
LF SANDY CREEK	TYGART VALLEY		May-03		5.0		20.0	70.0	5.0		88.8	OPTIMAL
RB/LF SANDY CREEK	TYGART VALLEY	2	Jun-04		5.0	10.0	10.0	70.0	5.0		86.3	OPTIMAL
RB/LF SANDY CREEK	TYGART VALLEY	2	May-03		5.0		20.0	70.0	5.0		88.8	OPTIMAL
RB/LF SANDY CREEK	TYGART VALLEY	2	Jul-03		5.0	10.0	20.0	60.0	5.0		83.8	OPTIMAL
RB/LF SANDY CREEK	TYGART VALLEY	1	Aug-04		5.0		20.0	70.0	5.0		88.8	OPTIMAL
UNT MIDDLE FORK RIVER	TYGART VALLEY		Jul-04		25.0		30.0	40.0	5.0		71.3	SUB OPTIMAL

STREAM	BASIN	STATION	DATE				COMPOSITION				INDEX	INTEGRITY
OTTLE AND	BAGII	OTATION	Ditte	SILT/CLAY	SAND	FINE GRAVEL	COARSE GRAVEL	COBBLE	BOULDER	BEDROCK	IIIDEX	IIVIEORITI
BOOTH CREEK	WEST FORK		Jul-03		10.0	80.0	10.0				50.0	MARGINAL
BRUSHY FORK	WEST FORK		Jul-03		8.0		25.0	65.0	2.0		86.8	OPTIMAL
ELK CREEK	WEST FORK		Mar-04	5.0			20.0	50.0	10.0		70.0	SUB OPTIMAL
HELENS RUN	WEST FORK		Aug-04	5.0	30.0	15.0	25.0	25.0			58.8	MARGINAL
ISAACS CREEK	WEST FORK		Jul-03	1.0	4.0		25.0	70.0			89.8	OPTIMAL
KINCHELOE CREEK	WEST FORK		Jul-03		14.0		55.0	30.0	1.0		75.3	SUB OPTIMAL
LAMBERTS RUN	WEST FORK		Jun-03		10.0	8.0	20.0	62.0			83.5	OPTIMAL
SALEM FORK	WEST FORK		May-03		8.3		20.0	47.6	24.1		76.7	SUB OPTIMAL
SKIN CREEK	WEST FORK		Apr-03	15.0	10.0		60.0	15.0			62.5	MARGINAL
TWO LICK CREEK	WEST FORK		Jul-03		4.0	5.0	10.0	60.0	21.0		81.5	OPTIMAL
UNT LAMBERTS RUN	WEST FORK		May-03	7.0	13.0	15.0	50.0	15.0		·	63.3	MARGINAL
RHINE CREEK	YOUGHIOGHENY		Apr-03		10.0	5.0	20.0	45.0	20.0		75.0	SUB OPTIMAL

Appendix 9. Program survey data sheets

about the health o	is form is to aid you in gathering and recording important data of your stream. By keeping accurate and consistent records of	HABITAT ASSESSMI extra space to write in indicate (check all box Water Clarity	any additional cor	mments. Often time	s you may see more	resemble those of yo than one type of cor	our stream. Use the
Save your observations	, you can document changes in your adopted stream conditions.	The state of the s					
Our		Clear	Mu	rky	Muddy	M	ilky
A STATE OF THE PARTY OF THE PAR		Water Color					
Streams		None		Green		Brown	
		Very dark (black)		Gray/white		Orange/red	
Stream Name	<u> </u>	Water Odor					
Persons completing the survey Affiliation		100000000000000000000000000000000000000					
Affiliation Mailing Address E-mail		None Sewage	_	Musky Chemical		Rotten egg Other	
E-mail	Web Page	150 NOV 100		STIGHT TO SE		0.0101	
Station # of participan	ts Watershed	Algae Abundance					
County Latitud	de Longitude	None		In Spots		Everywhere	
.ocation description (please be specific)	ts Watershed	Algae Color					
Average riffle width Average siffle de	ppth "River Reach" mile point	Light green	Dark	green	Brown	T 1 0	ther I
		Comments:		groon			ing.
PO ₄ PO ₂ PO ₃ PH PO ₃	Conductivity Dissolved O ₂ Other attributes (describe)	Algae Texture					
		Even coating	Ha	iry	Matted	Flo	ating
Weather for the past two days Fish and amphibians observed		Surface Foam None Streambed Color	Sli	ght	Moderate	H	eavy
Send this survey form and a copy of your macroinverte	brate tally sheet to the address below.	Brown		Green		Yellow	
Citizens Monitoring Coordinator	Quality Assurance Review	Black		Gray/white		Orange/red	
WV Division of Water and Waste Management 601 57th Street Charleston, WV 25304	Reviewers Name Review Date Comments	Stream Channel Sha	de: Estimate the a	amount of shade bas	ed on an estimate at	sunny full-leaf cond	itions.
	Comments	Excellent		Good	Marginal		Poor
Phone: (304) 926-0499 x 1040		> 80%		80 - 60	59 - 40		< 40%
Questions? Send e-mail to toraddock@wvdep.org		riffles you've selected	as your macroinv	ertebrate sample loc	ations. Record your		ble count within th
Collect a minimum of 2 (preferably 3) samples from the	best areas within your 100-meter survey reach. Use the tally	% Silt	% Sand	% Gravel	% Cobble	% Boulder	% Bedrock
sheet to indicate the types of macroinvertebrate groups approximate numbers (relative abundance). It is also a	s you collect, and the abundance coding system to record the dvisable to estimate the total taxa collected from your samples.						
		Comments					
Abundance Code System							
 A (Abundant) is > 100, C (Common) 10 - 100, and 	R (Rare) is < 10.	sore for each of the h	abitat attributes de	scribed on the next		ur habitat assessme	nt by providing a

LEVEL ONE

												vy dep		
Sediment De	ediment Deposition		o enlargen r point bars of the stree by sedimen	; less mbed	bar format		sar on bar	derate al d/gravel new and s; 30-50 eambed iment de	osits coint the ed by	materials and increa point bar formations more than 50% of it streambed affected; pools are absent or very shallow due to substantial sedimer deposition.				
Score		20 19	18 17	16	5 14 13	12 11	10	9 8	7	6	5	4 ks are	-	2 1
Bank Sta	bility	evidence failure; lit for future	e stable; no of erosion tle or no po problems.	or bank otential	stable; infr of erosion shown by over.	moderately equent areas occur, mostly panks healed	of e	nks are r table; 60 ch has s prosion; l ential for ing flood	0% of ome high r eros	the areas ion vents.	area alor or b ban failt of th	ny have as (bare ng strai pends; c ak collar ure; mo he reac sion sca	ght soil ght so obviouse o re the h has	s) ections us r en 60%
Left bank		10	9	8	7	6	5		4	3		2		1
Right bank		10	9	8	7	6	5	4	4	3		2		1
	Riparian Buffer Width		ndisturbed n of more to dence of hu such as pa- lbeds, clea reas, fields	iman rking r-cuts,	Zone of ur vegetation areas of d evident.	40-60 ft; son	ne dis	ne of und etation a surbed a nmon th reach.	20-40 reas	ft;	veg 20 f	ne of un etation ft; distu nmon the entire r	less rbed rroug	than areas hout
Left bank	1	10	9	8	7	6	5	19	4	3		2		1
Right bank		10	9	8	7	6	5		4	3		2		1

TOTAL HABITAT SCORE

HABITAT INTEGRITY: Insert your Total Habitat Score (THS) into the formula and compare your result to the integrity scale below.

= [THS ÷ 60] x 100

_

Excellent	Good	Marginal	Poor
> 80	80 - 65	64.9 - 50	< 50

LAND USE IMPACTS: Record all known land uses upstream and surrounding your monitoring site. Indicate whether they have a high (3), moderate (2), slight (1) or no (0) potential to impact the quality of the stream. Also, indicate whether the land use occurs beside the stream site (\$\mathbf{S}\), within \(\frac{1}{2} \) million of the stream site (\$\mathbf{M}\), or somewhere within the watershed (\$\mathbf{W}\)).

nd	
ck pasture	
farming	
roads	
re feedlots	
/e	feedlots
Livesto Poultry Paved	Livestock pasture construction Poultry farming Paved roads

Comments

MACROINVERTEBRATE TALLY

Stoneflies	Dragonflies	Gilled Smalls
Mayfiles	Damsetties	Pouch & Pond Shalls
Most Caddisflies	Water Bugs	Clams
Common Netspinning Caddisfly	Watershipe	Mussels
Riffle Beetle	Cranelly	Scuds
Water Penny	Horsefly/Deerfly	Craylish
Other Beetles	Other Fly Larva	Sowbugs
Fishflies & Dobsonflies	Blackfly Larva	Leeches
Alderlies	Midge Larva	Aquasio Worms
Other invertebrates collected or c	TOTAL PARTY WITH THE TOTAL PAR	Aquasic Worms Flatworms

Abundance Code System

A (Abundant) is > 100, C (Common) 10 - 100, and R (Rare) is < 10

Estimated Total Taxa

Revised - February 2005

¹ All caddisflies, except for the **common netspinning caddisfly** should be placed in this group.

STREAM INDEX CALCULATIONS – The relative abundance and the tolerance values are used to determine your stream index score. Use the table below and these instructions to help you calculate your stream index.

- Determine the points for each group based upon their relative abundance (abundance points). If the
 group is abundant A the point value is 3, if the group is common C the point value is 2 and if the group is rare R the point value is 1. Enter the point values for each macroinvertebrate group that you collect.
- 2. Multiply the abundance points by the macroinvertebrate group's tolerance to determine the tolerance point value.
- Sum all of the abundance points, and then sum all of the tolerance points.
 Divide the total tolerance points by the total abundance points. This number is your stream index. score. Use the formula on the next page and the scale to determine your biological integrity rating.

	Insect Groups		
Macroinvertebrate Groups	Abundance Points	Tolerance	Tolerance Points
Stoneflies		2	
Mayflies		3	
Caddisflies		3	Annual Control of the
Common Netspinning Caddislly		5	
Water Penny		4	
Riffle Beetles		4	
Other Beetles		5	
Water Bugs		8	
Fishflies		4	
Alderflies		6	
Dragonflies		5	
Damselflies		7	
Watersnipes		3	
Craneflies		4	
Blackflies		6	
Horseflies/Deerflies		6	
Other Fly Larva		7	
Midge Larva		8	
	Non-Insect Groups		
Gilled Snails		5	
Pouch or Pond Snails		7	
Clams		5	
Mussels		4	
Scuds "sideswimmer"		5	
Aquatic Sowbugs		7	
Crayfish		6	
Flatworms		7	
Aquatic Worms		10	- Commission of the Commission
Leeches		10	
Divide the total tolerance points by the total abundance points to calculate your stream index score. Use the formula on the next page to determine the biological integrity.	Total Abundance Points		Total Tolerance Points

STREAM INDEX SCORE

BIOLOGIAL INTEGRITY: Insert your Stream Index Score (SIS) into the formula and compare your result with the integrity scale below. If your calculation result is > 100, use 100.

= [(10-SIS) ÷ 7.0] x 100

Excellent	Good	Marginal	Poor
> 80	80 - 65	64.9 - 50	< 50

OVERALL ASSESSMENT

Compare all the information to complete an overall assessment. Consider water quality, biological and physical indicators, land uses and any other supporting information observed or collected. Please provide your comments below.

Fully Supporting	Threatened	Partially Supporting	Non Supporting
ossible causes & source:			
Threatened: All condi- Partially Supporting may show signs of im Non-Supporting: All Include any other commer	tions are adequate; howeve Certain conditions are not pairment. conditions (physical, biologi	support of a healthy stream envirous, there may be possible problems adequate; anyone of the biological call and chemical) show signs of imput and include topographic maps, processing the support of th	now or in the near future, physical or chemical attributes pairment,

00	
98	

Tatal United Const	Right bank score		Riparian Buffer Width	Right bank score	Bank Stability		Left bank score Right bank score	Bank Vegetative Protection	t Deposition	Score	Embeddedness	Parameters	Composition: Determine the cyour reach. Collect samples us habitats such as pools and riffl results. Even if you do not on estimate the composition of the you collect macroinvertebrate. Revised – February 2005 Revised – February 2005	or	Even coating Hairy Surface Foam	Light green Dark green	Murky	Use the boxes to check the constream (check all that apply). Figure detail or provide any additional	Discharge (cfs)Phy	Mailing address Phone/e-mail Directions to site	uctivity tributes (d	
Optimal	10 10	roadbeds, clear-cuts, mowed areas, crops etc.	Mainly undisturbed vegetation > 60 ft; no evidence of human impacts such as parking lots	10 9	erosion or bank failure; little or no potential for future problems.	Banks are stable; no evidence of	10 10 9	And the hand so the banks are covered by natural vegetation; all levels "treas, shrubs and levels "treas, shrubs and herbaceous vegetation" represented; disruption from grazing, mowing etc. minimal or absent; all plants allowed to grow naturally.	Little or no enlargement of islands or point bars; less than 5% of the streambed affected by sediment deposition.	20 19 18 17 16	Fine sediments surrounds and file 52% of the spaces between the gravel, cobble and boulders.	Optimal	ion of the streamt bble count from re les only. Use the pebble count, you bed materials fro you feel are impo	Green Yellow Whiteforay Redforance	Matted	Brown Ot	Geen Brown Brown White/gray Rediorange Musky Rotten egg Chemical Chemical Everywhere	Use the boxes to check the conditions that closely resemble those of your stream (check all that apply). Feel free to describe the conditions in more detail or provide any additional comments.	Water Level High Normal Low		escribe): Station Station	Basin
Sub Optimal	8 7 6	disturbance evident.	Zone of undisturbed vegetation 40-60 ft: some areas of	8 7 6	y shown by banks hea	Banks are moderately stable;	8 7 6 8 7 6	70-90% of the banks covered by natural vegelation; one level of plants may be missing or not well represented; some disruption of vegelation evident; more than 50% of the potential plant height remains.		15 14 13 12 11	Fine sediment surrounds and fills 25-50% of the spaces between the gravel, orbibe and boulders.	Sub Optimal	add eacl			her % Sitt/clay	e Totals	e of your in more	Low Dry	Pebble Cou		Silt/clay
Marginal	4 4	throughout the reach.	Zone of undisturbed vegetation 20-40 ft: disturbed areas common	4 4	sion; high potential for on during flooding ever	Banks are moderately unstable	ω ω 4 4 ω ω	50-70% of the banks covere natural vegetation; patches bare soil may be present an closely propped vegetation common; less than 50% of potential plant heights rema	terate amounts of sand/ osits on new and old po s; 30-50% of the stream oted by sediment depos	10 9 8 7 6	Fine sediment surrounds and fills 50-75% of the spaces between the gravel, obbite and boulders.	Marginal	reable Count Habitat Types: Record the ollected from the pools and riffles, or simply composition. Riffle Pool Bed material size is shown in millimeters (mm)	/depth warr goeth R		% Sand % Gravel %	তিয়াঙ তিয়াঙ তিয়াঙ			Pebble Count Data Sheet Silt Sand Gravel Gravel	.062 - 2 2 - 24 24 - 64 Grainy Pee to Matche to tentral size size	_
Poor	2 2 1	-	Zone of undisturbed vegetation less than 20 ft; disturbed areas	2 1 0	obvious bank collapse or far more then 60% of the reach erosion scars.	Banks are unstable; many have eroded areas (bare soils) alon	2 2 1 1 0		reavy deposits or me naterials vel and an increase in point bar formations; more than 50% of the streambed affected; pools are streambed affected; pools are n, absent or very shallow due to substantial sediment deposition.			Poor	Pebble Count Habitat Types: Record the percentage of the pebble counts collected from the pools and riffles, or simply indicate riffles if you estimated composition. Pool Ped material size is shown in millimeters (mm)	Riffle width/depth		6 Cobble % Boulder % Bedrock	Totals Totals Totals			Cobble Boulder Bedrock	64 - 256 256 - 1096 Ternishall to Baskethall size or larger	Cobble Boulder Bedrock

Miscellaneous	Gilled snail	Leech		Clam	Other fly larva	Same?	Blackfly iarva	Sowbug	Damselfly
Total #	Total #	Total #		Total #	Total #		Total #	Total #	Total #
# Of kinds	# Of kinds	# Of kinds		# Of kinds	# Of kinds		# Of kinds	# Of kinds	# Of kinds
Other organisms observed/collected (describe):	Pouch snail	Flatworm	3	Aquatic worm	Mussel)	Midge larva	Scud	Crayrish
The state of the s	Total #	Total #		Total #	Total #		Total #	Total #	000
-	# Of kinds	# Of kinds		# Of kinds	# CF KINGS		# Of kinds	# Of kinds	* CF Kings

Overall comments – Indicate threats to your stream or make any additional information such other information that you feel	information for you and send you and send you and send you are send you are send you are send you are space below to sketch include, as many features of the your reach where macroinverte	Macroinvertebrates Macroinvertebrates Macroinvertebrates Maythy Stonethy Caddistry Common Netspinner Water Penny Riffle Beetle Other
Overall comments – Indicate what you feel are the present and future threats to your stream or make any additional comments. Feel free to attach any additional information such as topographic maps, photographs or any other information that you feel is important.	information for you and send you the results. Revised – February 2005 Revised – February 2005 Use the space below to sketch a "birds eye view" of your stream reach. Include, as many features of the stream that you feel are important. Use an arrow to show the direction of flow and be sure to indicate the places within your reach where macroinvertebrate sample were collected.	information and to help you calculate each metric. Macroinvertebrates Total Kinds Tolerance Score Maythy Stonethy Caddistily Common Netspinner Water Penny Riffle Beetle Other Beetles Alderfly Alderfly Watershipe Cranethy Alderfly Watershipe Cranethy Fig. 1 and 1 a
Float Trials Float Distance Velocity (ti/sec) Cross Section (tř) Width (tt) 2	Cross Section and Discharge - Choose a section of your stream reach that you feel will represent the average cross-section and use the boxes below to record your measurements. If you use a float method for your discharge calculations, the float should be a neutrally buoyant object, something that floats just slightly submersed in the water.	## Wetrice ## Watershed: Also, indicate the approximate location (L) of the land use burban watershed (W). ### Watershed: Location Bridges, parking loss etc Unpaved road's Unpaved road's Unpaved road's Comments #### Water Location Packed in the Stream site (N). ###################################

Pool width/depth Webii Olbrid Riff			Sile	Smoothysick Gramy mattendure size	Revised - March 2005 Sediment Size Classes Sittlelay Sand G Sittlelay Sand G Sittlelay Sand G Sittlelay Sand G	Algae Texture Even coating	Algae Abundance None Algae Color Light green	None Sewage	Water Color None Black	Water Clarity Clear	Physical Descriptions Use the boxes to check the conditions that closely resemble those of your stream (check all that apply). Feel free to describe the conditions in more detail or provide any additional comments.	Phone/e-mail Directions to site	Stream County Latitude Monitor(s) Mailing addre
epth			Sand	Gramy Lexture	(4)		100			y Murky	s to check k all that an	site	S
WOTH DEPTH			vel e	* 8 E	Fine Fave	Hairy	In spots Dark green	Musky	Green White/gray		Physica the condition pply). Feel i	Wa	Longitude
Riffe	Totals		Coarse Gravel	Marble to T tennishall size		Matted	dis Brown	sy loal	n year	Muddy	Physical Descriptions conditions that closely y). Feel free to describe and comments.	Water Level	
Riffle width/depth			Cobble	Tennsball to basketball size		led		20	- R		ions sely resem cribe the co	Hon	Basin
n wapne			Boulder		Boulder 256 - 1096	Floating	Everywhere	Rotten egg Other	Brown Red/orange	Other	ble those o	High Normal Low	Station
нида			Bedrock	Large solid surface	Bedrock > 1096						f your more	ow Dry	Date
		Urban Sing family residences Construction Regreation Beidges, parking lots etc Paved roads Unpaved roads Unpaved roads Cother Land Use Comments	Moderate (2), Sight (1) potential to impact (t) the quality of the stream. Also, indicate the approximate location (L) of the land use Does it occurs beside the stream site (S), within ½ mile of the stream site (M), or within the stream's watershed (W).	Land Uses in the Watershed: Resurrounding your monitoring site.	unt Habitat Types: I	% Sittclay % Sand % Gravel	Composition: Determine the composition of the streambed materials within your reach. Collect samples using a pebble count from representative habitats such as pools and rifles, or rifles only. Use the table to on the next page record your results. Even if you do not complete a pebble count, you should always estimate the composition of the streambed materials from the rifles where you collect macroinvertebrate samples.	Total Suspended Solids Other (describe below)	Alkalinity/Hardness Iron Aluminum Manganese	Nitrate/initrite Total Phosphate Ammonia Fecal Coliform	Attributes Temperature ("F/C) Conductivity PH Dissolved Oxygen	Black White/gray Water Chemistry	None Slight Streambed Color
		Landisi Landisi Landisi Oil and gas wells Logging Abandoned mining Active mining Pastureland Cropland Feedlots	impact (I) the land of the stream	Record all know	cord the per	vel % Cobb	a pebble cou or riffles only you do not co osition of the extebrate sam				Result	gray	Moderate
				# 3	0.0	8	TP ST TE						rate

Total Habitat Score	Right bank score	Riparian Buffer Width	Left bank score Right bank score	Bank Stability	Left bank score Right bank score	Bank Vegetative Protection	Score The next three parameters are so	Channel Alteration	Score	Parameters Channel Flow Status	Velocity and Depth Combinations Score		Attachment Sites for Invertebrates	Riffle Frequency	dente	Sediment Deposition	Embeddedness Edamala in illes Scotte
Optimal > 160	10 9	Mainly undisturbed vegetation > 60 ft, no evidence of human impacts such as parking lots, roadbeds, clear-cuts, mowed areas, crops etc.	10 9	Banks are stable; no evidence of erosion or bank failure, little or no potential for future problems.	10 9	90% of the banks are y natural vegetation; all es, shrubs and is vegetation. Surprised disruption from rowing etc. minimal or owing at allowed to grow I plants allowed to grow	20 19 18 17 16 are scored from both sides of the stream reach	ightening, dredç bankments, dan ments etc. abse eam has a natu	20 19 18 17 16	Optimal Water reaches the base of both lower banks and a minimal amount of channel substrate is exposed.	Shallow slow deep, fast shallow and fast deep, slow is <1 files and deep is 1.5 feet = 1.20 feet = 1.2	All four velocity/depth	Viell developed riffes and runs; riffes are as wide as the stream and their lengths is up to two times the stream's width, cobble is prevalent, boulders and gravel also common.	more than abitat variety h continuous he presence ends and	Occurrence of riffles very	Little or no enlargement of islands or point bars; less than 5% of the streambed affected by sediment deposition.	Fine sediments surrounds and fills 0-25% of the spaces between the gravel, cobble and boulders.
Sub Optimal 159 - 130	8 7 6	of undisturbed vegetat ft; some areas of pance evident	8 7 6	Banks are moderately stable; infrequent areas of erosion occur, mostly shown by banks healed over.	8 7 6	70-90% of the banks covered that it is a plants may be missing or not represented; some disruption was the pattern of the patt	ech 13 12 11	Some type of channel alteration present, usually in areas of bridge abutments, no evidence of recent channel alterations.	15 14 13 12 11	Sub Optimal Water fills more than 75% of the channel, less than 25% of the channel substrate is exposed	present; fast currents generally dominate (score lower if they are absent). 15 14 13 12 11	3 of 4 velocity/depth combinations	Riffies are as wide as the stream but their length is less than two times the stream's width; cobble less abundant, gravel, boulders and other substrates maybe more common.	Occurrence of riffles relatively frequent, making up 40-60% of the reach; bends and/or other structures may provide additional habitat.	14		Fine sediment surrounds and fills 25-50% of the spaces between the gravel, cobble and boulders.
Marginal 129 - 100	5 4 3	of undisturbed vegetat) ft, disturbed areas con ghout the reach.	5 5 4 4 3	Banks are moderately unstable: 60% of the reach has some areas of erosion; high potential for erosion during flooding events.	on o	50-70% of the banks covere natural vegetation; patches bare soil may be present an ciocely cropped vegetation common; less than 50% of potential plant heights rema-	10 9 8 7 6	Artificial embankment structure present, at least to some extern on both sides of the stream; 4 80% of the reach has been aftered.	10 9 8 7 6	Marginal Water fills 25-75% of the channel, much of the riffle areas are exposed.	present (score) lower if (ast ourself areas are absent). 10 9 8 7 6		Riffle and runs lacking, if riffles are present they are not as wide as the stream nor is their length two times the stream's width, two times the stream's width coobble area, other substrate more common.	Coccurrence of misse in request, making up 20-40% of the reach, there are occasional riffes and bends, but the distances between such areas have greatly increased. 10 9 8 7 6	Occurrence of nilles inframient		Fine sediment surrounds and fills 50-75% of the spaces between the gravel, cobble and boulders.
* 100	2 1 0	Zone of undisturbed vegetal less than 20 ft; disturbed an common throughout the ent reach.	2 1 0	Bar ero obv ero	22	Less than 50% of the banks covered by natural vegetatic disruption is high, vegetatic been removed or the poten plant heights are greatly rec	5 4 3 2 1 0	Stream banks are shored will gabions, rip/rap, cement etc. more than 80% of the reach been disrupted.	5 4 3 2 1 0	Poor Very little water in the channel, mostly present as only standing pools.	velocity/depth regime (usually slow-shallow or slow-deep). 5 4 3 2 1 0	Stream res	Riffles and runs virtually nonexistent, large boulders and/or bedrock may be prevalent, or the reach may be mainly flat water throughout with finer sediments.	20% mostly all flat water throughout the reach, if riffles are present they are generally shallow and have very little cobble. 5 4 3 2 1 0	Oncurrence of riffles less than	Heavy deposits of fine materials and an increase in point bar formations; more than 50% of the streambed affected; pools are absent or very shallow due to substantial sediment deposition.	Fine sediment surrounds and fills more than 75% of the spaces between the gravel, cobble and boulders.

Miscellaneous	Gastropoda OPERCULATE SMALL	Sphaeridae/Corbiculidae una	Unionidae	Aftericidae vantusamer	Other Dipters February	Zygoptera www.err.cr	² All caddisflies, except for Hydrop	Elimidae more sear ce	Pasphonidas waterneur	Hydrops yehidae Comor ner svonea	Libraria Cultura II	anti-da
Total #		Total #	OCIAN HI			Total #	All caddisflies, except for Hydropsychidae , are to be recorded in this category	Total #	Total #		Tribal th	
Family Other organisms observed/collected (describe)		Family Oligochaeta ADDATE WOOM Turbellaria POTRICOM Turbellaria POTRICOM	ranny sopous	0.0.0	Family Amphipoda scuo	Family Anisophers descours:	Category	amily Chitonomidae mose	Family Simulidae success		Family Siglidge AUERT	Consideration Parezyrosecurity
sorbe);	Total #	Total #	o Guara	Total #	Total#	Total #		Total #	Total #	Total #	Total # I	Total #

Ephemeroptera www.v Plecoptera stotety Trichoptera closses v Comments	Invertabrate Taxon Aquatic Insects Ephemeropicra MATEN Plecoptera SOMEN Psephenidae WATEN Psephenidae
Total Diplord TRE FUES Odomaid BRASHEVESMEELES Calcoptera BRETIES Calcoptera and misc	Invertebrate Taxon Aquatic Insects Ephtemeroptura WAFFAY Flychoptera CACOPSTAY Trichoptera CACOPSTAY Trichopt
Use the space below to sketch a "birds eye view" of your stream reach. Include, as many features of the stream that you feel are important. Use an arrow to show the direction of flow and be sure to indicate the places within your reach where macroinvertebrate sample were collected.	The stream index score is the average point-score from the six different metrics. The metrics work best when more than 100 invertebrates are collected. For less numbers an alternate scoring method should be considered. If you are unsure about the calculations, the coordinator can provide instructions on how to calculate each metric, or will evaluate the information for you and send you the results. Metrics Values Points Points

		Revised – March 2005	West Virginia Save Our Streams WV DEP's Division of Water and Waste Management 601 57th Street, SE Charleston, WV 25304 Questions? Send e-mail to tdraddock@wvdep.org	Fully Supporting Partially Supporting Submit the survey to the address below:	Overall Assessment – Indicate your final assessment by checking a box below, and describe what you feel are the possible causes and sources of disturbances to your stream reach. Also feel free to use these spaces to make any additional comments. Finally, include any additional information such as topographic maps, photographs or any other information that you feel is important.
			agement	Non Supporting	s and sources of these spaces to tonal information from that you
rs and streams, and common in ponds, lakes and wetland.	X		Discharge = Cross Section × Correction × Velocity 0.50 Total Discharge = (t²/sec) or di If you used an alternate method to measure flow (i.e. flow meter or velocity head rod) record your results and describe your method in the spaces below (t²/sec) or discorded.	Average Cross Section =	Cross Section and Discharge - Choose a section of your stream reach that you feel will represent the average cross-section and use the boxes below to record your measurements. If you use a float method for your discharge calculations, the float should be a neutrally buoyant object, something that floats just slightly submersed in the water. Float Trials Float Distance Velocity (fibec) Cross Section (ff') 2 3 4 4 5 5 5 5 5 5 5 5

Appendix 10. Trout Unlimited water quality data

	10. Hour eminine	1							r.		
Date	Stream	County	Sampler	Location Description	Alkalinity	Acidity	рН	Temp	Turbidity	Water Level	Fe
16-Apr-04	Missouri Run	Webster	Crowder	At the Forks	66	2	7.9	55°	Mild	High	None
14-Apr-04	Elk	Randolph	Crowder	Elk Springs	27	1	7.79	54°	None	High	None
10-Apr-04	Morris Creek	Kanawha	Crowder	At Falls Crossing	14	2	7.22	54°	None	High	None
18-Mar-04	Amos Run	Webster	Crowder	Below Forks	75	2	7.94	45°	None	High	None
14-Mar-04	Elk Creek of Guyandotte	Logan	Lee Orr		53	1.5					
14-Mar-04	Horsepen Creek	Mingo	Lee Orr	Near Gilbert 37*36.88 N 81*53.25 W Elev 1560'	58	0					
14-Mar-04	Pigeon Creek	Mingo	Lee Orr	Near Varney 37*38.97 N 82*82.38 W Elev 1235'	240+	0					
12-Mar-04	Elk Creek of Guyandotte	Logan	Lee Orr		60						
12-Mar-04	Spice Creek - Tug Fork	McDowell	Lee Orr	Premier	140	1					
11-Mar-04	Polemic Run	Nicholas	Nester Crowder	Mouth	15	1		40°		High	
11-Mar-04	Powell Creek	Nicholas	Nester Crowder	Above Rt. 82	25	1		40°		High	
16-Feb-04	Amos Run Left Fork	Webster	Crowder	At Forks	34	4	7.08	41°	None	High	Yes
16-Feb-04	Amos Run Right Fork	Webster	Crowder	At Forks	30	4	7.25	39°	None	High	None
31-Oct-03	Laurel of Second Creek	Greenbrier	Maguire	Below Archer Fork	26	4		45°		Normal	
07-Oct-03	Culverson Creek	Greenbrier	Nester	Rt. 17 Bridge	90	2		54°			
07-Oct-03	Locust Creek	Pocahontas	Nester	Rt. 31 Covered Bridge	137	0		59°			
07-Oct-03	Mill Creek	Greenbrier	Nester	Rt. 66 Bridge	140	3		54°			
07-Oct-03	Muddy Creek	Greenbrier	Nester	Rt. 25 Br - Alderson	95	2		54°			
07-Oct-03	Sinking Creek	Greenbrier	Nester	Rt. 60/10 Bridge	57	2		52°			
07-Oct-03	Spring Creek	Greenbrier	Nester	Rt. 13 Bridge	66	1		57°			
07-Oct-03	Stamping Creek	Pocahontas	Nester	Barnett Cabins	110	0		59°			
02-Aug-03	Cranberry Creek	Mercer	Nester	RR Trestle	79	1		64°	Clear		
02-Aug-03	Piney	Raleigh	Nester	Above Cranberry	102	0		69°	Milky		
26-Jul-03	Strange Creek	Nicholas	Crowder	.2 miles from bridge just of Rt 1	12	2.5?		65°	Clear	Normal	None
25-Jul-03	Elk	Webster	Orr	RR Trestle in C&R	62	1		62°	Clear	Low	None
24-Jul-03	Big Spring of East River	Mercer	Nester	Rt. 219/8	181	1		64°	Clear		
24-Jul-03	Dropping Lick	Monroe	Nester	Zenith Road Bridge	123	0		59°	Clear		
24-Jul-03	East River	Mercer	Nester	Above Pigeon Creek	148	1		64°	Clear		
24-Jul-03	Howard's Creek	Greenbrier	Nester	Rt. 60 Br Caldwell	90	0		74°	Clear		
24-Jul-03	Kitchen Creek	Monroe	Nester	Rt. 3 – Cheese Store	99	0		66°	Clear		
24-Jul-03	Pigeon Creek	Mercer	Nester	Mouth	164	1		56°	Clear		
24-Jul-03	Rich Creek	Monroe	Nester	Wilson Mill Rd. Bridge	124	1		59°	Clear		
24-Jul-03	Second Creek	Monroe	Nester	Above Rt. 15 Gap Mills	97	1		64°	Milky		
24-Jul-03	Sweet Springs	Monroe	Nester	Rt. 3/14 Sweet Sp.	181	10		61°	Clear		
24-Jul-03	Turkey Creek	Monroe	Nester	Rt. 29/1 Willow Bend	122	1		56°	Clear		
13-Jul-03	Cup Run of Elk River	Pocahontas	Nester	Rt. 66	50	3		58°		Normal	
13-Jul-03	Stony Creek	Pocahontas	Nester	Rt. 219	90	4		60°		Normal	

Date	Stream	County	Sampler	Location Description	Alkalinity	Acidity	рН	Temp	Turbidity	Water Level	Fe
13-Jul-03	Swago Creek	Pocahontas	Nester	Rt. 219	90	2		55°		Normal	
11-Jul-03	Big Spring Fork of Elk	Pocahontas	Nester	Mouth	60	1		63°		Normal	
11-Jul-03	Old Field Fork of Elk	Pocahontas	Nester	Mouth	40	1		64°		Normal	
06-Jun-03	Dry Fork	Tucker	Orr	Mennonite Church 2.7 mi. downstream of Harman	45	3		58°	Clear	High	None
06-Jun-03	Gandy Creek	Randolph	Orr	1.9 mi. above bridge at Whitmer	18	1		58°	Clear	High	None
06-Jun-03	Greenbrier - W. Fork	Pocahontas	Maguire	A few miles upstream of mouth of Little River	8	4		50°	Clear	High	
06-Jun-03	Greenbrier - Mill Run	Pocahontas	Maguire	Trib that enters the W. Fork at May from the east	9	3		50°	Clear	High	
06-Jun-03	Seneca Creek	Randolph	Orr	Just above confluence with White's Run	14	1		58°	Clear	High	None
06-Jun-03	Seneca Creek	Randolph	Orr	Bridge 1.3 mi. below confluence with White's Run	19	1		58°	Clear	High	None
06-Jun-03	Seneca Creek	Randolph	Orr	Below Rt. 33 bridge at Onego	30	1		58°	Clear	High	None
06-Jun-03	White's Run	Randolph	Orr	Mouth	25	2		54°	Clear	High	None
08-May-03	Deer Creek	Pocahontas	Maguire	Cases Road Bridge (below mouth of North Fork)	32	2		52°	Cloudy	High	
08-May-03	Dunmore Spring	Pocahontas	Maguire	Upstream of old resort swimming pool foundation	112	4		55°			
08-May-03	North Fork of Deer Creek	Pocahontas	Maguire	Upstream paved County Road crossing	20	2		46°	Clear	High	
08-May-03	Shaver's Fork	Randolph	Maguire	Linan Bridge	16	4		48°	Clear	High	
08-May-03	John's Camp Run	Randolph	Maguire	FS Road Crossing	4	11		42°	Clear	Normal	
08-May-03	Shaver's Fork - Glade Run	Randolph	Maguire	Just upstream of FS Road Crossing	12	4		40°	Clear	High	
08-May-03	Shaver's Fork - Glade Run	Randolph	Maguire	30 yds downstream of FS Road and DNR Lime station	14	2		40°	Clear	High	
08-May-03	Shaver's Fork - First Fork	Randolph	Maguire	2 FS Road Crossing	19	1		44°	Chalky	Normal	
08-May-03	Fish Hatchery Run	Randolph	Maguire	FS Road Crossing	6.8	2		53°	Tad Cloudy	High	
08-May-03	Sitlington Creek	Pocahontas	Maguire	Dunmore	42	3		65°	Normal	Low	
27-Apr-03	Cherry River - North Fork	Nicholas	Maguire	2.5 mi. downstream of Bear Run	10	4		50°	Clear	Normal	
27-Apr-03	Summit Lake	Nicholas	Green	Middle	10	3		54°			
25-Apr-03	Milligan Creek	Greenbrier	Maguire	Mouth	138	12		42°			
25-Apr-03	Second Creek	Greenbrier	Maguire	FFO	80	3		51°			
24-Apr-03	Big Spring of East River	Mercer	Nester	Rt. 219/8 Hales Gap Rd. Bridge	134	1		53°			
24-Apr-03	Elk - Slaty Fork	Pocahontas	Maguire	RR Trestle at downstream end of special regs	45	2		51°			
15-Apr-03	Back Creek	Monroe	Maguire	Trib of Indian	147	8		50°			
15-Apr-03	Indian Draft	Monroe	Maguire	Trib of Indian - Rt. 7	103	5		49°			
15-Apr-03	Laurel Creek	Monroe	Maguire	Trib of Indian	48	4		52°			
15-Apr-03	Laurel Run	Monroe	Maguire	Trib of Wolf - Rt. 3 Br.	19	3		49°			
15-Apr-03	Rock Camp	Monroe	Maguire	0.8 mi above mouth	134	3		53°			
15-Apr-03	Wolf Creek	Monroe	Maguire	0.36 mi above Broad	158	3		49°			
14-Apr-03	Big Clear Creek	Greenbrier	Maguire	Above Anjean	30	2		50°			
14-Apr-03	Brown's Creek	Greenbrier	Maguire	Near Big Clear Cr.	25	3		50°			
14-Apr-03	Indian Creek	Monroe	Maguire	Covered Bridge - Rt. 219	132	7		50°			
14-Apr-03	Little Clear Creek	Greenbrier	Maguire	1.7 mi above Rt. 60	28	3		52°			

Date	Stream	County	Sampler	Location Description	Alkalinity	Acidity	рН	Temp	Turbidity	Water Level	Fe
13-Apr-03	Cherry River - North Fork	Nicholas	Maguire	2 mi. downstream of Bear Run	5	3					
13-Apr-03	Cherry River - North Fork	Nicholas	Maguire	2.5 mi. downstream of Bear Run	4	2					
13-Apr-03	Cherry River - North Fork	Nicholas	Maguire	Just upstream of above sample	13	2		38°			
13-Apr-03	Howard's Creek	Greenbrier	Maguire	Rt. 60 Br Church	26	3		47°			
13-Apr-03	Monroe Draft	Greenbrier	Maguire	1.25 mi above mouth	28	3		42°			
13-Apr-03	Second Creek	Greenbrier	Maguire	Rt. 29 Bridge	50	3		44°			
12-Apr-03	Howard's Creek	Greenbrier	Maguire	Rt. 60 Br Church	13	1		50°			
11-Apr-03	Greenbrier River Trib	Greenbrier	Maguire	Horrock Sta. Rt. 7/2	125	5		40°			
03-Apr-03	Bruffey Creek	Pocahontas	Maguire	Lobelia & Bruffey Road	16	5		43°			
03-Apr-03	Cave Run of Bruffey Creek	Pocahontas	Maguire	Rt. 29 Bridge	30	3		42°			
03-Apr-03	Hills Creek	Pocahontas	Maguire	Poca. Trailhead	9	4		37°			
03-Apr-03	Hills Creek	Pocahontas	Maguire	FS Gate above Lobelia	8	2		43°			
03-Apr-03	Locust Creek	Pocahontas	Maguire	Rt. 31 Covered Bridge	62	4		38°			
03-Apr-03	Millstone Creek	Pocahontas	Maguire	Rt. 29 Br Lobelia Rd.	12	2		40°			
03-Apr-03	Rush Run	Pocahontas	Maguire	Rt. 29 Br. S. of Lobelia	40	3		44°			
23-Mar-03	Loop Creek	Fayette	Nester	Baptist Church	93	0		52°			
20-Mar-03	Big Draft of Anthony	Greenbrier	Maguire	Big Draft Road	7	2		37°			
20-Mar-03	Buckeye Creek	Greenbrier	Maguire	1.75 mi above cave	42	3		39°			
20-Mar-03	Howard's Creek	Greenbrier	Maguire	Eakle Church	18	1		38°			
20-Mar-03	Rocky Run of Anthony	Greenbrier	Maguire	Mouth	7	2		37°			
19-Mar-03	Cochran Creek	Pocahontas	Maguire	Rt. 92 USFS Camp.	3	1		36°			
19-Mar-03	Knapp's Creek	Pocahontas	Maguire	1 mi below Min. Sp.	18	2		46°			
19-Mar-03	Meadow Creek	Greenbrier	Maguire	Mouth	4	2		38°			
19-Mar-03	Meadow Creek	Greenbrier	Maguire	Below Laurel Run	5	2		38°			
19-Mar-03	Stamping Creek	Pocahontas	Maguire	Mouth	45	3		39°			
19-Mar-03	Swago Creek	Pocahontas	Maguire	Rt. 219 Buckeye	47	3		41°			
19-Mar-03	Walnut Spring	Pocahontas	Maguire	Rt. 39 Devil's Back.	105	6		45°			
18-Mar-03	Big Branch	Monroe	Maguire	Mouth	12	2		64°			
18-Mar-03	Hart's Run	Greenbrier	Maguire	So. Boun. Gr St. For.	10	2		38°			
18-Mar-03	Laurel Creek	Monroe	Maguire	Below Archer Fork	14	2		42°			
18-Mar-03	Laurel of Second Creek	Greenbrier	Maguire	Below Archer Fork	14	2		42°			
18-Mar-03	Milligan Creek	Greenbrier	Maguire	Herns Covered Bridge	116	3		46°			
18-Mar-03	Tucahoe Run	Greenbrier	Maguire	Tucahoe Lake	10	2		40°			
17-Mar-03	Back Creek	Monroe	Maguire	Bridge below Cove	22	3		45°			
17-Mar-03	Ewin Run	Monroe	Maguire	Rt. 21	58	2		48°			
17-Mar-03	Sweet Springs	Monroe	Maguire	Rt. 3/14 Sweet Sp.	160	12		49°			
16-Mar-03	Flynn Creek	Greenbrier	Orr	Rt. 10/43 Bridge	5	1		45°			
16-Mar-03	Indian Creek	Greenbrier	Nester	Rt. 9 Bridge	17	1		49°	Milky	Normal	

Date	Stream	County	Sampler	Location Description	Alkalinity	Acidity	рН	Temp	Turbidity	Water Level	Fe
16-Mar-03	Kitchen Creek	Greenbrier	Orr	Rt. 31 Bridge	22	1		56°			
16-Mar-03	Milligan Creek	Greenbrier	Orr	Herns Covered Bridge	106	1		48°			
16-Mar-03	Muddy Creek	Greenbrier	Orr	Rt. 31 Bridge	35	2		42°			
16-Mar-03	Roaring Creek	Greenbrier	Orr	Rt. 10/2 near Trout	5	1		45°			
16-Mar-03	Robbins Run	Greenbrier	Nester	Rt. 5/2 Bridge (3 mi.)	5	1		46°	Clear	High	
16-Mar-03	Spring Creek	Greenbrier	Orr	Rt. 5 - Leonard	8	1		46°			
16-Mar-03	Tater Creek - Trib	Greenbrier	Nester	Hartsook Road Br.	30	2		46°			
15-Mar-03	Back Creek	Monroe	Orr	Bridge below Cove	18	1		42°	Clear	Normal	
15-Mar-03	Cove Creek	Monroe	Nester	Gate - below Pedro	28	1		48°	Clear	Normal	
15-Mar-03	Ewin Run	Monroe	Orr	Rt. 20	44	1		48°	Clear	Normal	
15-Mar-03	Kitchen Creek	Monroe	Nester	Rt. 3 - Cheese Store	83	0		44°	Clear	Normal	
15-Mar-03	Mill Creek	Greenbrier	Hayne	Rt. 60 - Hines	13	1					
15-Mar-03	Second Creek	Greenbrier	Orr	Rt. 3 below Kitchen	77	0		54°	Clear	Normal	
15-Mar-03	S. Fork Potts	Monroe	Maguire	Above Waiteville	6	2		47°	Clear	Normal	
15-Mar-03	Sweet Springs	Monroe	Nester	Rt. 3/14 Sweet Sp.	126	5		49°	Clear	Normal	
15-Mar-03	Trout Branch	Monroe	Hayne	Rt. 20 Culvert	56	3		45°	Clear	Normal	
15-Mar-03	Turkey Creek	Monroe	Nester	Rt. 13/3 Culvert	90	1		52°	Clear	Normal	
02-Feb-03	East River	Mercer	Nester	Above Pigeon Creek	90	0		36°			

Appendix 11. Study design outline

Getting Started: Organize your Technical Committee

- 1. List the members of your technical committee and their expertise.
 - Write a job description that describes the roles and responsibilities of the technical committee members.

Step 1: Why are you monitoring?

- 1. Provide background information on your river: For example, describe the geography of your stream, where it begins, where it joins larger water bodies and other important characteristics of its watershed.
- 2. List (or put on a map) the classifications and the designated uses or other ecological values associated with your river.
- 3. List the uses, values and threats identified by the members of your river's communities.
- 4. Describe the issues facing your river posed by the threats or conflicts and what, if anything is being done to address them?
 - List the river segments that do not support, or only partially support, their designated uses
 - List the threats, causes or reasons that specific river segments do not support their designated uses.
 - *List the protection or restoration efforts underway to address the problems.*
 - List the information that you believe you will need in order to address the issues.
 - What type of information will you need to define and evaluate the extent of the problems?
 - What type(s) of information will you need to define and evaluate effective solutions?
- 5. List the specific questions you will try to answer through stream monitoring.

Step 2: What will you monitor?

- 1. List the indicators you will use to monitor your river.
- 2. Describe the significances of each indicator(s) and how they will help you answer your questions.

Step 3: What are your data quality objectives and requirements?

- 1. List the intended uses and users of your information.
- 2. List your data quality objectives.
- 3. List your data quality requirements of the sampling and analysis of each indicator:
 - *Accuracy* is how close are your results are to the true values.
 - **Precision** is how close are your results, through repeated analysis of the same sample, to each other.
 - Sensitivity is the smallest change or lowest concentration you seek to detect.

Step 4: How will you monitor?

- 1. Describe how you will collect your samples.
 - What will be sampled (e.g. the water, bottom sediment, aquatic life etc.)?

- List the types of sampling containers and/or other equipment and devices to be used.
- What quantity of sample(s) will be collected?
- How many samples will your monitoring team collect at each location?
- Provide a description of your procedures (reference a particular method if applicable).
- 2. Describe how you will analyze the samples.
 - How will the samples be transported to the lab (if applicable), and what is your chain of custody procedures?
 - *How soon after collection will your samples be analyzed?*
 - What method(s) will be used to analyze the samples: Site a particular method such as "EPA Method 360.2", or "WV Save Our Streams Monitoring Manual".
 - *Provide a brief description of your procedures.*
 - What units will your results be reported in?

Step 5: Where will you monitor?

- 1. List the criteria you used to select sampling sites.
- 2. List each sampling site and the rationale for each one. This could be a table with the following column heading:
 - Site "station" Number and/or name.
 - *How the site be sampled (e.g. wading, from shore, by boat etc.).*
 - Why the site is being monitored.
- 3. List where each indicator will be analyzed (field or lab etc.).

Step 6: When will you monitor?

- 1. List the sampling and analysis dates for each type of sampling.
- 2. List the time of day each sample will be taken.
- 3. List the holding times for each type of sample.

Step 7: Who will monitor?

- 1. List the paid and volunteer positions.
 - Title
 - Responsibilities
 - *Name, address, phone number, e-mail etc.*

Step 8: What are your quality assurance and quality control (QAQC) measures?

- 1. List the QAQC measures you will use:
 - Internal checks
 - External checks
- 2. Describe each one and how it will be carried out.

Put your plan in writing and review it annually

• Your technical committee should complete an annual review of your study design document with input from others, especially field personnel.

Appendix 12. Description of the program metrics

The data analysis scheme used by WV Save Our Streams integrates biotic indices (metrics) to evaluate the stream's condition. A metric is a numerical value or narrative expression that describes the characteristics of a living aquatic community. The complexity of biological systems, and the varied impacts humans have on them, require a broad based multimetric approach that integrates information from individual, population, and assemblage levels. Each index measures a different component of the macroinvertebrate community and has a different range of sensitivity to pollution stress. This approach provides better statistical precision due to the variety of parameters evaluated. Examples of the metrics used to analyze the macroinvertebrate community are described below.

- 1. **% EPT Abundance**: This index is the percentage of the three most pollution sensitive groups, the order *Ephemeroptera* (mayflies), *Plecoptera* (stoneflies), and *Trichoptera* (caddisflies). Generally, with a few exceptions, a high percentage of EPT's indicates healthy stream conditions. % EPT is calculated by dividing the total number of EPT's by the total number of organisms in your sample, then multiply by 100 to obtain the percentage.
- 2. **Taxa Richness**: This index is the total number of kinds in your sample. Taxa richness is calculated by simply adding the total number of kinds. A healthy stream generally has a wide variety of organisms (high diversity) with most families sensitive to disturbances.
- 3. **EPT Richness**: This index is the total number of EPT kinds in your sample. EPT Richness is calculated by adding the number of EPT kinds. A healthy stream has a high diversity represented from the EPT families.
- 4. **Hilsenhoff Biotic Index (HBI)**: This index is based upon the stress tolerance of the organism to organic pollution or low levels of dissolved oxygen. The families or orders are rated on a scale from 0 to 10, with 0 being the most sensitive and 10 being the most tolerant. HBI is calculated by multiplying the total number within a category by their respective tolerance values. The results of all these multiplication are then summed and divided by the total number of organisms in the sample. Ideally the index should be a low number, which indicates an overall sensitive community. Higher values indicate increasing numbers of tolerant organisms dominating the community.
- 5. **% Chironomid**: This index is the percentage of the samples midges, family *Chironomidae* (midges). % Chironomid is calculated by dividing the total number of midges by the total number of organisms in the sample. Multiply by 100 to obtain the percentage. A high percentage of midge larvas are often an indication of impaired conditions.
- 6. **% Dominant Taxa**: This index is an estimation of the two most dominant taxa (family or kinds) within your sample. The index is calculates by first adding the top two most dominant families and then dividing by the total number of organisms. Multiply by 100 to obtain the percentage. Dominance of a particular group(s) sometimes an indication of an imbalanced community, which is often an indication of impairments.

